

# EX4400 Switch Hardware Guide

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*EX4400 Switch Hardware Guide*

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# Table of Contents

About This Guide | ix

1

## Fast Track: Initial Installation

Fast Track to Rack Installation and Power | 2

Install the EX4400 in a Rack | 2

Connect to Power | 3

Claim, Onboard, and Configure EX4400 | 5

2

## System Overview and Specifications

EX4400 System Overview | 8

EX4400 Ethernet Switch | 8

Field-Replaceable Units in EX4400 Switches | 11

Extension Modules in EX4400 Switches | 12

Mounting Options for EX4400 Switches | 16

EX4400 Models and Specifications | 17

EX4400 Chassis | 69

Chassis Physical Specifications for EX4400 Switches | 70

Chassis Status LEDs on EX4400 Switches | 73

LEDs on the Management Port on EX4400 Switches | 75

LEDs on the RJ-45, SFP, and SFP+ Network Ports, QSFP28 Ports, and Extension Module Ports  
on EX4400 Switches | 77

Cooling System and Airflow in an EX4400 Switch | 88

EX4400 Power System | 104

AC Power Supply in EX4400 Switches | 105

DC Power Supply in EX4400 Switches | 123

Power Supply LEDs in EX4400 Switches | 134

## 3

## Site Planning and Preparation

**Site Preparation Checklist for EX4400 Switches | 141**

**EX4400 Site Guidelines and Requirements | 144**

Environmental Requirements and Specifications for EX4400 Switches | 144

General Site Guidelines | 145

Site Electrical Wiring Guidelines | 146

Rack Requirements | 147

Cabinet Requirements | 147

Clearance Requirements for Hardware Maintenance for EX4400 Switches | 149

**EX4400 Network Cable and Transceiver Planning | 150**

Pluggable Transceivers and Cables Supported on EX4400 Switches | 150

RJ-45 Port, SFP Port, SFP+ Port, QSFP+ Port, and QSFP28 Port Connector Pinout Information | 151

Overview of EX Series Switches: Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion | 158

Calculate the Fiber-Optic Cable Power Budget for EX Series Devices | 159

Calculating the Fiber-Optic Cable Power Margin for EX Series Devices | 160

**EX4400 Management Cable Specifications and Pinouts | 162**

Management Cable Specifications | 162

Console Port Connector Pinout Information | 163

USB Port Specifications for an EX Series Switch | 164

RJ-45 Management Port Connector Pinout Information | 165

RJ-45 to DB-9 Serial Port Adapter Pinout Information | 166

## 4

## Installation and Configuration

**Install the EX4400 Switch | 168**

Unpack an EX4400 Switch | 168

Packing List for an EX4400 Switch | 169

Update Base Installation Data | 170



Mount an EX4400 Switch on Two Posts of a Rack | **171**

Mount an EX4400 Switch Flush with the Front Posts of a Four-Post Rack or Cabinet | **174**

Mount an EX4400 Switch in a Recessed Position in a Rack or Cabinet | **177**

Mount an EX4400 Switch on a Desk or Other Level Surface | **181**

Mount an EX4400 Switch on a Wall | **182**

## **How to Install an ORv3-Compliant Switch with Tray Assembly (1 OU) in Your ORv3 Rack | 187**

Unpack the Switch-Tray Assembly | **187**

Parts Inventory (Packing List) | **188**

Install the Switch-Tray Assembly in an ORv3 Rack | **189**

Uninstall the Switch-Tray Assembly from the ORv3 rack | **193**

Ground the Switch-Tray Assembly | **196**

## **Connect the EX4400 to Power | 196**

Connect Earth Ground to an EX4400 Switch | **197**

Connect AC Power to an EX4400 Switch | **198**

Connect DC Power to an EX4400 Switch | **200**

Connect Power to an EX4400-48F-S Switch Using the 550-W VDC PSU | **202**

Connect 2000-W DC Power to an EX4400 Switch | **204**

## **Connect the EX4400 to External Devices | 207**

Connect a Device to a Network for Out-of-Band Management | **207**

Connect a Device to a Management Console Using an RJ-45 Connector | **208**

Connect an EX4400 Switch to a Management Console by Using the USB-C Console Port | **210**

## **Register Products—Mandatory to Validate SLAs | 211**

## **Connect the EX4400 to the Network | 211**

Install a Transceiver | **212**

Install a QSFP28 Transceiver | **215**

Connect a Fiber-Optic Cable | **217**

## **Configure Junos OS on the EX4400 | 217**

Connect and Configure an EX4400 Switch by Using the CLI | 218

EX4400 Default Configuration | 223

Revert an EX4400 Switch to the Factory-Default Configuration | 231

Revert to the Factory-Default Configuration by Using the request system zeroize Command | 232

Revert to the Factory-Default Configuration by Using the load factory-default Command | 233

Revert to the Factory-Default Configuration by Using the Factory Reset/Mode Button | 234

## **Maintain Components**

### **Maintain the EX4400 Cooling System | 236**

Remove a Fan Module from an EX4400 Switch | 236

Install a Fan Module in an EX4400 Switch | 238

### **Maintain the EX4400 Power System | 239**

Remove a Power Supply from an EX4400 Switch | 240

Install a Power Supply in an EX4400 Switch | 242

### **Maintain the EX4400 Extension Modules | 245**

Remove an Extension Module from an EX4400 Switch | 245

Install an Extension Module in an EX4400 Switch | 248

### **Maintain Transceivers | 251**

Remove a Transceiver | 252

Install a Transceiver | 254

### **Maintain Fiber-Optic Cables | 257**

Connect a Fiber-Optic Cable | 257

Disconnect a Fiber-Optic Cable | 258

How to Handle Fiber-Optic Cables | 259

### **Maintain Breakout Cables | 260**

Disconnect a Breakout Cable | 260

Connect a Breakout Cable | 263

## **Maintain Direct Attach Cables | 265**

Disconnect a Direct Attach Cable | 265

Connect a Direct Attach Cable | 267

## **Maintain Active Optical Cables | 270**

Disconnect an Active Optical Cable | 270

Connect an Active Optical Cable | 272

6

## **Troubleshoot Hardware**

### **Troubleshoot the EX4400 Components | 277**

Troubleshoot Temperature Alarms in EX Series Switches | 277

Chassis Component Alarm Conditions on EX4400 Switches | 283

EX4400 Switch Hardware and CLI Terminology Mapping | 286

7

## **Contact Customer Support and Return the Chassis or Components**

### **Return an EX4400 Chassis or Components | 293**

How to Return an EX4400 Switch or Component for Repair or Replacement | 293

Locate the Serial Number on an EX4400 Switch or Component | 294

List the Switch and Components Details with the CLI | 294

Locate the Chassis Serial Number ID Label on an EX4400 Switch | 299

Locate the Serial Number ID Labels on FRUs in an EX4400 Switch | 300

Contact Customer Support to Obtain a Return Material Authorization | 305

Pack an EX4400 Switch or Component for Shipping | 306

Pack an EX4400 Switch for Shipping | 306

Pack EX4400 Switch Components for Shipping | 308

8

## **Safety and Compliance Information**

### **Safety Information for EX4400 | 310**

#### **AC Power Electrical Safety Guidelines for EX4400 Switches | 310**

#### **DC Power Electrical Safety Guidelines for EX4400 Switches | 311**

#### **Agency Approvals for EX4400 Switches | 312**

#### **Compliance Statements for EMC Requirements for EX4400 Switches | 314**



# About This Guide

Use this guide to install hardware and perform initial software configuration, routine maintenance, and troubleshooting for the EX4400 switch. After completing the installation and basic configuration procedures covered in this guide, refer to the Mist Wired Assurance documentation to learn more about configuration and management of the switch. You can refer Junos OS documentation also for more information about software configuration using the Junos OS CLI.

# 1

CHAPTER

## Fast Track: Initial Installation

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### IN THIS CHAPTER

- [Fast Track to Rack Installation and Power | 2](#)
  - [Claim, Onboard, and Configure EX4400 | 5](#)
-

# Fast Track to Rack Installation and Power

## SUMMARY

This procedure guides you through the simplest steps for the most common installation to get your EX4400 switch in a rack and connect it to power.

Have more complex installation needs? See ["Install the EX4400 Switch" on page 168](#).

## IN THIS SECTION

- [Install the EX4400 in a Rack | 2](#)
- [Connect to Power | 3](#)

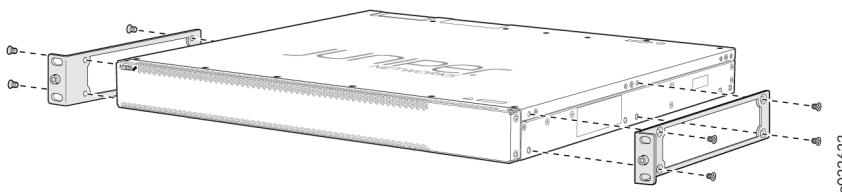
## Install the EX4400 in a Rack

You can install the EX4400 switch on a desktop or other level surface, in a two-post or four-post rack, or on a wall. We'll walk you through the steps to install an AC-powered switch in a two-post rack.

**Before you install, review the following:**

- ["EX4400 Site Guidelines and Requirements" on page 144](#).
- [General Safety Guidelines and Warnings](#).
- ["Packing List for an EX4400 Switch" on page 169](#).

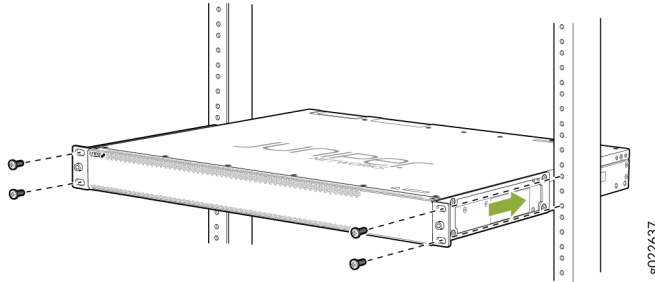
1. Place the switch on a flat, stable surface.
2. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end to a site ESD point.
3. Attach the mounting brackets to the sides of the EX4400 switch using the eight screws in the rack mount kit and a screwdriver.



4. Lift the switch and position it in the rack. Position the switch so that the AIR IN labels on the fan modules are facing the cold aisle, or the AIR OUT labels on the fan modules are facing the hot aisle.

Line up the bottom hole in each mounting bracket with a hole in each rack post, making sure the switch is level.

5. While you're holding the switch in place, have a second person insert and tighten the rack mount screws to secure the mounting brackets to the rack posts. Tighten the screws in the two bottom holes first, and then tighten the screws in the two top holes.



6. Check that the mounting brackets on each side of the rack are lined up with each other.
7. Cover the empty extension module and the power supply slots by using the covers that came with the switch.

## Connect to Power

### IN THIS SECTION

- [Ground the EX4400 Switch | 3](#)
- [Connect the Power Cord and Power On the Switch | 4](#)

To connect the EX4400 switch to AC power, you must do the following:

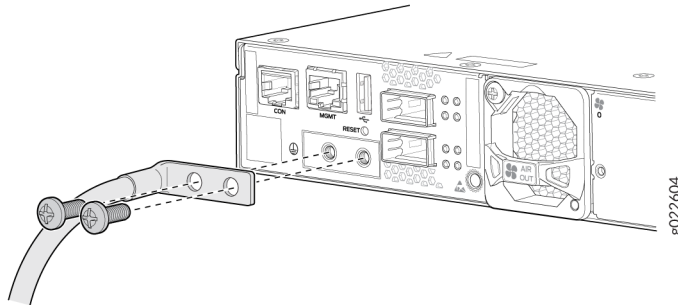
### Ground the EX4400 Switch

To ground the EX4400 switch, do the following:

1. Connect one end of the grounding cable to a proper earth ground, such as the rack.



2. Place the grounding lug attached to the grounding cable over the protective earthing terminal on the rear panel.



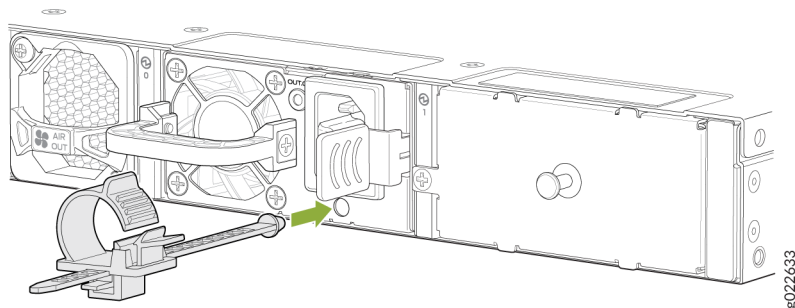
3. Secure the grounding lug to the protective earthing terminal using the 10-32 x .25-in. screws with #10 split-lock washers.
4. Dress the grounding cable. Be sure that the cable doesn't block access to or touch other device components, and that it doesn't drape where people could trip over it.

## Connect the Power Cord and Power On the Switch

For information about the supported AC power cord specifications, see [Table 53 on page 108](#).

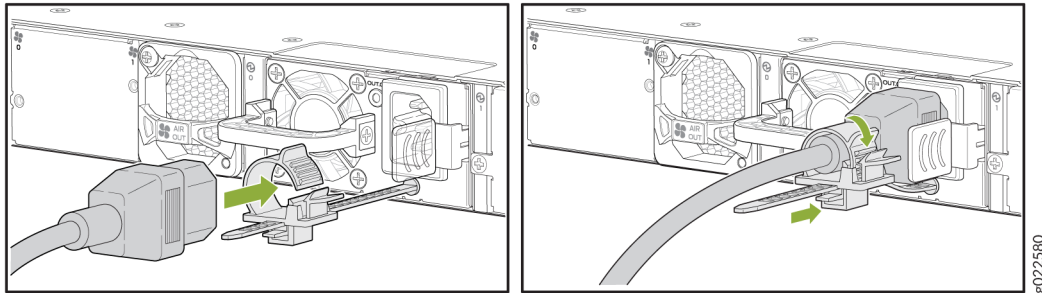
To connect the power cord, do the following:

1. Ensure that the power supply is fully inserted in the rear panel of the switch.
2. On the rear panel, connect the retainer strip and power cord to the AC power socket:
  - a. Push the end of the retainer strip into the hole next to the AC power socket until it snaps into place. Ensure that the loop in the retainer strip points upward.



- b. Press the small tab on the retainer strip to loosen the loop.

- c. Slide the loop until you have enough space to insert the power cord into the AC power socket.
- d. Firmly plug in the power cord to the AC power socket on the switch.
- e. Slide the loop toward the power supply until it is snug against the base of the power cord coupler.
- f. Press the tab on the loop, and draw out the loop into a tight circle.



- 3. If the AC power source outlet has a power switch, turn it off.
- 4. Plug in the power cord to the AC power source outlet.
- 5. If the AC power source outlet has a power switch, turn it on. The switch powers on as soon as you plug it in. The EX4400 doesn't have a power switch.
- 6. Check to see that the `OUT. OK` LED on the power supply is lit steadily green. If not, disconnect the power supply from the power source. You'll need to replace the power supply (see [Maintain the EX4400 Power System](#) in the [EX4400 Switch Hardware Guide](#)).

## Claim, Onboard, and Configure EX4400

### SUMMARY

This topic provides you the pointers to onboard and configure EX4400 switches using Mist, or configure EX4400 switches using Junos CLI.

EX4400 switch is a cloud-ready switch, and you can manage this switch using [Mist AI cloud portal](#). If you have a Mist Wired Assurance license, you can follow a few simple steps to get an EX4400 up and running in the Juniper Mist AI cloud portal. See [Table 1 on page 6](#) for more information.

**Table 1: Onboard and Configure EX4400 Using Mist**

If you want to	Then
Claim and Onboard to Mist	See <a href="#">Cloud-Ready EX and QFX Switches with Mist</a>
Configure Wired Assurance	See <a href="#">Juniper Mist Wired Configuration Guide</a>
See all documentation available for Wired Assurance	Visit <a href="#">Wired Assurance Documentation</a>

If you do not have a Mist Wired Assurance license, you can configure EX4400 using Junos CLI. See [Table 2 on page 6](#) for more information.

**Table 2: Configure EX4400 Using Junos CLI**

If you want to	Then
Customize basic configuration	See <a href="#">"Configure Junos OS on the EX4400" on page 217</a>
Explore the software features supported on EX4400	See <a href="#">Feature Explorer</a>
Configure Junos features on EX4400	See <a href="#">User Guides</a>

# 2

CHAPTER

## System Overview and Specifications

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### IN THIS CHAPTER

- EX4400 System Overview | 8
  - EX4400 Models and Specifications | 17
  - EX4400 Chassis | 69
  - Cooling System and Airflow in an EX4400 Switch | 88
  - EX4400 Power System | 104
-

# EX4400 System Overview

## SUMMARY

Learn about the key features and benefits, models and specifications, and FRUs and extension modules of EX4400 switches.

## IN THIS SECTION

- [EX4400 Ethernet Switch | 8](#)
- [Field-Replaceable Units in EX4400 Switches | 11](#)
- [Extension Modules in EX4400 Switches | 12](#)
- [Mounting Options for EX4400 Switches | 16](#)

## EX4400 Ethernet Switch

### IN THIS SECTION

- [Benefits of the EX4400 Switch | 9](#)
- [EX4400 Switch Models | 10](#)
- [Virtual Chassis | 11](#)

The Juniper Networks® EX4400 line of switches are a family of secure and cloud-ready access switches suited for enterprise branch, campus, and data center networks. EX4400 switches offer a strong hardware foundation with best-in-class security in combination with the simplicity of the cloud and the power of [Mist AI](#). You can use [Juniper Mist Wired Assurance](#) to onboard, configure, and manage EX4400 from the cloud with minimal effort. You can manage EX4400 switches by using the CLI or J-Web also.




These are the key hardware features of EX4400 switches:

- Quad-core x86 CPU, 4-GB DDR4 memory with support for error correction code (ECC), and 20-GB eMMC storage

- PoE models (EX4400-24P, EX4400-24MP, EX4400-48P, EX4400-48MP, EX4400-48XP, and EX4400-48MXP) support IEEE 802.3bt Power over Ethernet (PoE-bt), fast Power over Ethernet (PoE), and Perpetual PoE
- Hot-swappable AC or DC power supplies. We ship EX4400 switches with one AC or DC power supply. Order an additional power supply and power cord separately if you need 1+1 redundancy. For more information about the EX4400 power system, see [EX4400 Power System](#)
- Dual hot-swappable fan trays that provide front-to-back or back-to-front airflow. For information about the cooling system and airflow in EX4400, see [Cooling System and Airflow in an EX4400 Switch](#)
- A slot to install an optional extension module. See ["Extension Modules in EX4400 Switches" on page 12](#) for more details

For information about the software features supported on EX4400, see [Feature Explorer](#).

**Table 3: Hardware Overview Videos**

 <p>Video: <a href="#">EX4400 Switches</a></p>	 <p>Video: <a href="#">Multigigabit EX4400 Switches</a></p>	 <p>Video: <a href="#">EX4400-24X Switches</a></p>
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## Benefits of the EX4400 Switch

**Cloud readiness**—EX4400 switches are our first cloud-ready switches. You can deploy the switches and manage them by using Juniper Mist.

**Support for Virtual Chassis**—EX4400 switches support Virtual Chassis technology. You can interconnect up to 10 EX4400 switches to form a Virtual Chassis.

**Support for channelization**—You can channelize the QSFP28 ports on the EX4400 switch and increase the number of interfaces.

**Support for MACsec and EVPN-VXLAN architecture**—EX4400 switches support IEEE 802.1AE Media Access Control Security (MACsec) and EVPN-VXLAN. Support for MACsec and EVPN-VXLAN ensures link-layer data confidentiality, data integrity, and data origin authentication to help secure deployments in enterprise multicloud deployments. On the EX4400 switches, the MACsec AES-256 encryption capability is supported on all RJ-45, SFP, and SFP+ network ports. MACsec AES-256 is supported on the SFP28 ports of the 25GbE (EX4400-EM-4Y) and the QSFP28 ports of the 100GbE (EX4400-EM-1C) extension modules. EX4400-24X supports MACsec AES-256 on the native front-panel 100GbE ports as well.

**Support for IEEE 802.3bt Power over Ethernet (PoE-bt)**—The RJ-45 ports in EX4400-24P, EX4400-24MP, EX4400-48P, EX4400-48MP, EX4400-48XP, and EX4400-48MXP switches support IEEE 802.3bt (PoE-bt), providing power of up to 90 W per port. These ports also support **fast PoE** and **Perpetual PoE**.

**Support for High PoE Budgets**—The EX4400-48XP and EX4400-48MXP switch models support 2000 W AC power supplies and can deliver a PoE budget of up to 3600 W when equipped with dual AC PSUs. Their corresponding spare models, EX4400-48XP-S and EX4400-48MXP-S, support 2000 W DC power supplies and can also deliver up to 3600 W of PoE with dual DC PSUs.

EX4400-48P, EX4400-24P, EX4400-24MP, and EX4400-48MP models support up to 2200 W PoE budgets when powered by 1600 W AC power supplies.

Additional spare models—EX4400-48P-S, EX4400-24P-S, EX4400-24MP-S, and EX4400-48MP-S also support the 2000 W DC PSU and offer PoE budgets of up to 2200 W when powered by dual DC PSUs .

**Compact solution**—The EX4400 switch is a modular single rack unit (1-U) device that is an apt solution for crowded wiring closets and access switch locations. The switch provides carrier-class reliability of modular systems with the economics and flexibility of stackable platforms.

**High availability**—EX4400 switches provide high availability through redundant power supplies and fans, graceful Routing Engine switchover (GRES), and nonstop bridging (NSB) and nonstop active routing (NSR) when deployed in a Virtual Chassis configuration.

## EX4400 Switch Models

EX4400 line of switches consist of both PoE and non-PoE models and multigigabit port models. These switches run on either AC or DC power and support either back-to-front or front-to-back airflow. [Table 4 on page 10](#) provides a summary of the EX4400 switch models. Click on each link in the table to find more information about the model.

**Table 4: EX4400 Switch Models**

Non-PoE Models	PoE Models	Multigigabit Models
<a href="#">"EX4400-24T" on page 22</a>	<a href="#">"EX4400-24P" on page 18</a>	<a href="#">"EX4400-24MP" on page 57</a>
<a href="#">"EX4400-24X" on page 29</a>	<a href="#">"EX4400-48P" on page 42</a>	<a href="#">"EX4400-48MP" on page 61</a>
<a href="#">"EX4400-48T" on page 50</a>	<a href="#">"EX4400-48XP Switch" on page 46</a>	<a href="#">"EX4400-48MXP Switch" on page 65</a>
<a href="#">"EX4400-48F" on page 35</a>		

## Virtual Chassis

You can use the quad small form-factor pluggable 28 (QSFP28) ports to interconnect a maximum of 10 EX4400 switches to form a Virtual Chassis. On EX4400 switch models except EX4400-24X, the QSFP28 ports are on the rear panel. On the EX4400-24X model, the QSFP28 ports are on the front panel.

On EX4400 switch models except EX4400-24X, the QSFP28 ports are configured as Virtual Chassis ports (VCPs) by default. Each of the two QSFP28 ports operates as two logical 50-Gbps VCP interfaces. On the EX4400-24X model, you can configure the QSFP28 ports as VCPs by using the `request virtual-chassis mode hgoe` CLI command.

You can operate the interconnected switches as a single, logical device with a single IP address. For more information about Virtual Chassis, see *Understanding EX Series Virtual Chassis*.

You can configure the QSFP28 ports as network ports and operate them as 100GbE network ports or uplink ports by using QSFP28 transceivers and by using the CLI command `request virtual-chassis mode .`

## Field-Replaceable Units in EX4400 Switches

Field-replaceable units (FRUs) are components that you can replace at your site. The FRUs in EX4400 switches are hot-removable and hot-insertable: You can remove and replace them without powering off the switch or disrupting switch functions. The following are the FRUs in EX4400 switches:

- Power supplies
- Fan modules
- Extension modules
- Transceivers



**NOTE:** If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/support/tools/updateinstallbase/>. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.



## Extension Modules in EX4400 Switches

EX4400 switches provide a slot to install an optional extension module. Extension modules are hot-insertable and hot-removable field-replaceable units (FRUs): You can remove and replace them without powering off the switch or disrupting switch functions.



**NOTE:** The extension module must be powered-off/made offline before removing it from the chassis. Use `request chassis pic offline fpc-slot X pic 2` to offline the extension module. Use `request chassis pic online fpc X pic 2` to bring the extension module online.

You can install an extension module horizontally in the extension module slot on the front panel of the switch. You can use the ports on the extension module to connect the switch to other devices. By installing an extension module, you add more ports to your switch, thereby increasing the port density of the switch.

[Table 5 on page 13](#) shows the extension modules supported on EX4400 switches, their descriptions, and the first Junos OS release the extension modules support.

Table 5: Extension Modules Supported on EX4400 Switches

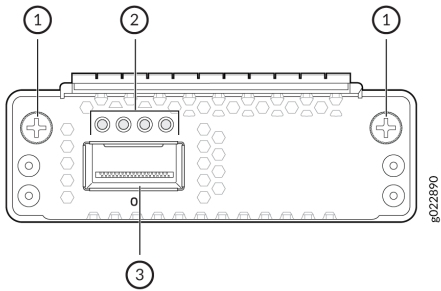
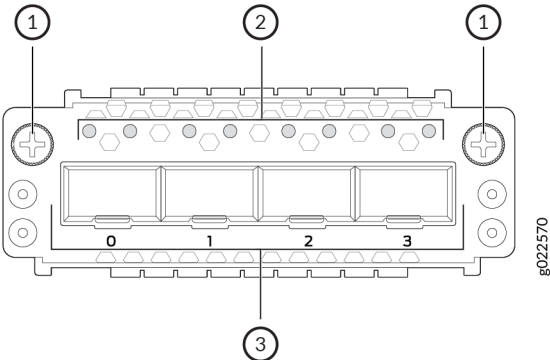
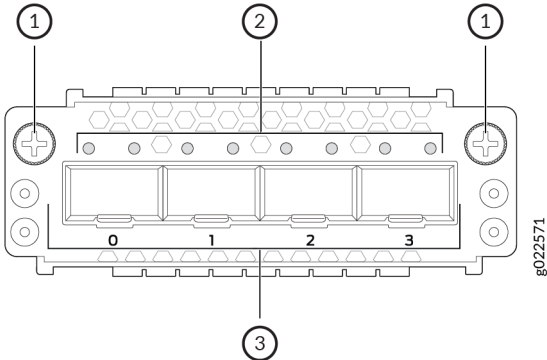
Extension Module	Description	First Junos OS Release
1x100GbE QSFP28 extension module (model number: EX4400-EM-1C)	<p>The 1x100GbE QSFP28 extension module supports Media Access Control Security (MACsec) with AES-256 encryption. You can install one 40GbE QSFP+ transceiver or one 100GbE QSFP28 transceiver in the extension module. You can channelize the port on the extension module to support 10-Gbps and 25-Gbps speeds by connecting a breakout cable and by using CLI configuration.</p> <p><b>Figure 1: 1x100GbE QSFP28 Extension Module for EX4400 Switches</b></p>  <p>1– Captive screws                      3– QSFP28 port</p> <p>2– LEDs</p>	<p>23.1R1</p> <p><b>NOTE:</b> EX4400 switches except EX4400-24X require System CPLD Firmware 1.0 or later installed in them to support the 1x100GbE QSFP28 extension module. EX4400-24X switches require System CPLD Firmware 0.6 or later installed in them to support the 1x100GbE QSFP28 extension module. See <i>Installing and Upgrading Firmware</i> and for steps to upgrade the firmware.</p>

Table 5: Extension Modules Supported on EX4400 Switches *(Continued)*

Extension Module	Description	First Junos OS Release
4x10GbE SFP+ extension module (model number: EX4400-EM-4S)	<p>You can install up to four 1GbE SFP transceivers or 10GbE SFP+ transceivers in the 4x10GbE SFP+ extension module. Do not install SFP transceivers and SFP+ transceivers in the extension module at the same time.</p> <p><b>Figure 2: 4x10GbE SFP+ Extension Module for EX4400 Switches</b></p>  <p>1– Captive screws</p> <p>2– LEDs</p> <p>3– SFP+ ports</p>	21.1R1

**Table 5: Extension Modules Supported on EX4400 Switches (Continued)**

Extension Module	Description	First Junos OS Release
4x25GbE SFP28 extension module (model number: EX4400-EM-4Y)	<p>The 4x25GbE SFP28 extension module supports Media Access Control Security (MACsec) with AES-256 encryption. You can install up to four 1GbE SFP transceivers, four 10GbE SFP+ transceivers, or four 25GbE SFP28 transceivers in the extension module. Do not install different types of transceivers in the extension module at the same time.</p> <p><b>Figure 3: 4x25GbE SFP28 Extension Module for EX4400 Switches</b></p>  <p>1— Captive screws      3— SFP28 ports</p> <p>2— LEDs</p>	21.1R1



**NOTE:** From Junos OS Release 24.2R1-S1, all extension modules are supported on EX4400-48XP and EX4400-48MXP.

Extension modules and transceivers are not part of the shipping configuration. You must order them separately.

When you install an extension module in the switch or replace an extension module with another extension module, the switch detects the extension module. The output of the `show chassis pic fpc-slot slot number pic slot number` command displays the operating speed of the extension modules. You must configure the extension module to operate at the speed of the transceiver that you plan to install in the extension module. The switch detects the transceiver that you install in the extension module port and displays the transceiver details in the output of the `show chassis hardware` command.

The 1x100GbE QSFP28 extension module operates in 100-gigabit mode by default. It operates in 40-gigabit mode if you insert a 40GbE QSFP+ transceiver. When the extension module is operating in 100-gigabit mode, you can channelize the port and configure it to operate in 25-gigabit mode by using the `set chassis fpc 0 pic 2 port 0 channel-speed 25g` command and a 4x25GbE breakout cable. When the extension module is operating in 40-gigabit mode, you can channelize the port and configure it to operate in 10-gigabit mode by using the `set chassis fpc 0 pic 2 port 0 channel-speed 10g` command and a 4x10GbE breakout cable.

The 4x25GbE SFP+ extension module operates in 25-gigabit mode by default. You can configure all the ports in the extension module to operate in 10-gigabit mode by using the `set chassis fpc 0 pic 2 port 0 speed 10g` command. You can configure all the ports in the extension module to operate in 1-gigabit mode by using the `set chassis fpc X pic 2 port 0 speed 1g` command. You can revert to the 25-gigabit mode by using the `set chassis fpc 0 pic 2 port 0 speed 25g` command or the `delete chassis fpc 0 pic 2 port 0 speed 10g` command. All the ports in the extension module can operate in the same mode only.

The 4x10GbE SFP+ extension module operates in 10-gigabit mode by default. You can configure all the ports in the extension module to operate in 1-gigabit mode by using the `set chassis fpc 0 pic 2 port 0 speed 1g` command. You can revert to the 10-gigabit mode by using the `set chassis fpc 0 pic 2 port 0 speed 10g` command or the `delete chassis fpc 0 pic 2 port 0 speed 1g` command. All the ports in the extension module can operate in the same mode only.

Each port on the extension modules has a pair of LEDs that indicate the link activity and status of the port. See ["LEDs on the RJ-45, SFP, and SFP+ Network Ports, QSFP28 Ports, and Extension Module Ports on EX4400 Switches" on page 77](#) for details about the LEDs.

## Mounting Options for EX4400 Switches

You can mount the EX4400 switches on a two-post rack, four-post rack, on the desk or a level surface, or on the wall. The EX4400 switch package includes the brackets to install it on a two-post rack, and the rubber feet required to install it on the desk or level surface. [Table 6 on page 16](#) describes the mounting kits available for EX4400 switches.

**Table 6: Mounting Kits for EX4400 Switches**

Model Number	Description
EX-RMK	Mounting brackets to install the EX4400 switch on a two-post rack or on two posts of a 19-in. four-post rack. This mounting kit is provided as part of the switch package.

Table 6: Mounting Kits for EX4400 Switches (*Continued*)

Model Number	Description
EX-4PST-RMK	Adjustable 4-post rack-mount kit to install the EX4400 switch on a 19-in. four-post rack. You have to order this mounting kit separately.
EX-WMK	Wall mount kit to install the EX4400 switch on a wall. You have to order this mounting kit separately.

## EX4400 Models and Specifications

### SUMMARY

This topic provides details of the EX4400 models and their specifications, information on number of ports and PoE support, throughput, BASE-X and components in the shipment for each model.

### IN THIS SECTION

- [EX4400-24P Switch | 18](#)
- [EX4400-24T Switches | 22](#)
- [EX4400-24X Switch | 29](#)
- [EX4400-48F Switches | 35](#)
- [EX4400-48P Switch | 42](#)
- [EX4400-48XP Switch | 46](#)
- [EX4400-48T Switches | 50](#)
- [EX4400-24MP Switch | 57](#)
- [EX4400-48MP Switch | 61](#)
- [EX4400-48MXP Switch | 65](#)

The EX4400 line of switches consist of both PoE and non-PoE models and multigigabit port models. These switches run on either AC or DC power and support either back-to-front or front-to-back airflow.

Let's take a look at the different EX4400 models and their specifications.

Table 7: EX4400 Switch Models

Non-PoE Models	PoE Models	Multigigabit Models
"EX4400-24T" on page 22	"EX4400-24P" on page 18	"EX4400-24MP" on page 57
"EX4400-24X" on page 29	"EX4400-48P" on page 42	"EX4400-48MP" on page 61
"EX4400-48T" on page 50	"EX4400-48XP Switch" on page 46	"EX4400-48MXP Switch" on page 65
"EX4400-48F" on page 35		

## EX4400-24P Switch

### Components on the Front and Rear Panels of EX4400-24P Switches

Figure 4 on page 18 shows the front view of an EX4400-24P switch with 24 RJ-45 ports that support PoE-bt.

Figure 4: Front View of an EX4400-24P Switch



Figure 5 on page 18 shows the rear view of an EX4400-24T and EX4400-24P switch with AC power supplies.

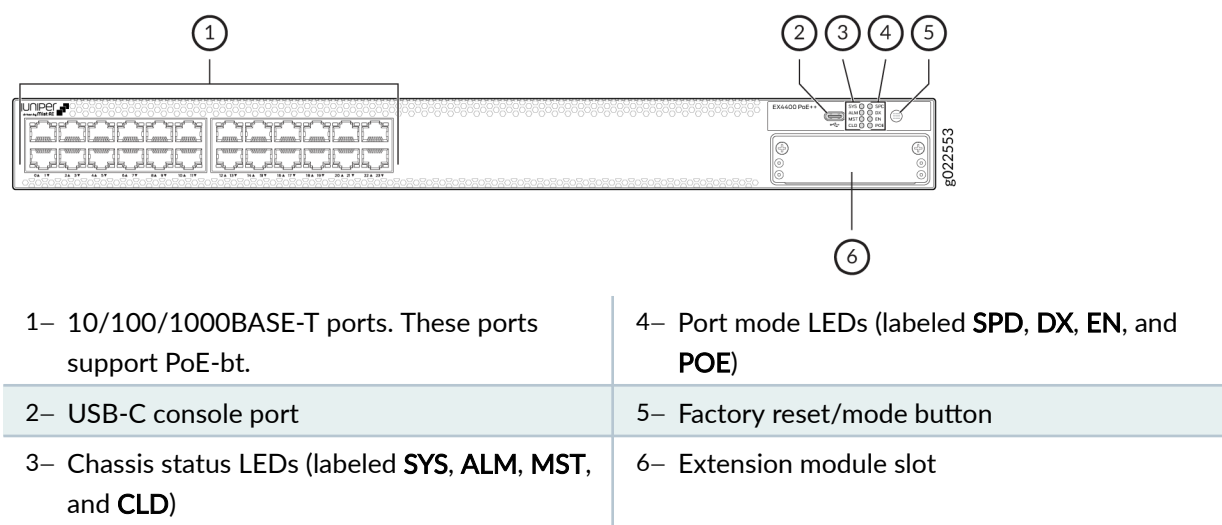
Figure 5: Rear View of an EX4400-24P Switch with AC Power Supplies



**NOTE:** We enabled the **CLD** LED feature in Junos OS Release 21.2R1.

Figure 6 on page 19 shows the components on the front panel of an EX4400-24P switch.

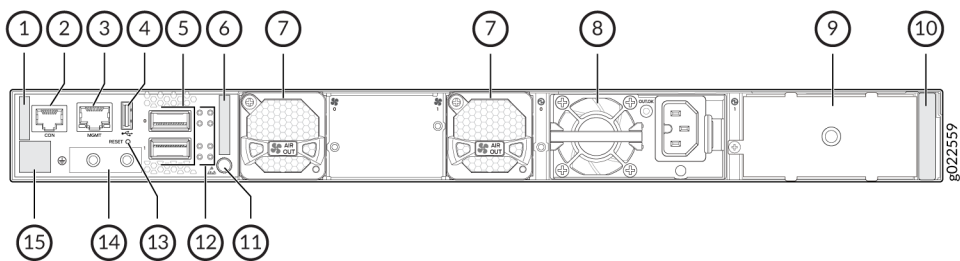
Figure 6: Components on the Front Panel of an EX4400-24P Switch



**NOTE:** We enabled the **CLD** LED feature in Junos OS Release 21.2R1.

Figure 7 on page 19 shows the components on the rear panel of an EX4400-24P switch. This model supports 1050-W, 1600-W AC and the 2000-W DC power supplies. The 2000-W DC power supply is separately orderable with the spare switch model - EX4400-24P. The EX4400-24P switch supports 1600-W AC power supply if you have Junos OS Release 22.3R1 or later installed. We ship the switch with one 1050-W power supply. You can order the additional power supply separately. You must not install different models of power supplies in the same chassis.

Figure 7: Components on the Rear Panel of an EX4400-24P Switch





1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label
8– Power supply	

Table 8 on page 20 lists the components shipped with EX4400-24P switch models.

Table 9 on page 20 describes the physical specifications, ports, and throughput of EX4400-24P switches.

Table 10 on page 22 describes the power supply and cooling system specifications of EX4400-24P switch models

**Table 8: EX4400-24P Switch Models, Shipped Components, and First Junos Release**

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-24P	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 1050-W AC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	21.1R1
EX4400-24P-S	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1

**Table 9: EX4400-24P Switches—Physical Specifications, Ports, Throughput**

Item	Description	
Chassis Dimensions	Height	1.72 in. (4.37 cm)

Table 9: EX4400-24P Switches—Physical Specifications, Ports, Throughput *(Continued)*

Item	Description	
	Width	17.39 in. (44.17 cm)  The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).
	Depth	15.71 in. (39.9 cm)—With no power supply, fan module, or extension module installed  16.93 in. (43 cm)—With power supply and fan module installed  17.35 in. (44.07 cm)—With power supply, fan module, and extension module installed
Weight	<ul style="list-style-type: none"> <li>Switch with no power supply, fan module, or extension module installed (EX4400-24P): 6.9 kg</li> <li>Switch with no power supply, fan module, or extension module installed (EX4400-24P-S): 5.66 kg</li> <li>Fan module: 0.26 lb (0.12 kg)</li> <li>1050 W AC power supply: 1.98 lb (0.9 kg)</li> <li>1600 W AC power supply: 2.0 lb (0.91 kg)</li> <li>2000 W DC power supply: 2.05 lb (0.93 kg)</li> <li>1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>	

Table 9: EX4400-24P Switches—Physical Specifications, Ports, Throughput *(Continued)*

Item	Description
Built-in ports	10/100/1000BASE-T ports: 24  100GbE QSFP28 ports: 2
PoE Ports (PoE-bt)	24—delivers upto 90 W per port
Throughput	324 Gbps—Unidirectional)  648 Gbps—Bbidirectional

Table 10: EX4400-24P Switch Models, Power Supplies, Cooling System

Model	Power Supply Specifications	Cooling System Specifications
EX4400-24P	Two power supply slots with one power supply preinstalled  1050 W AC (preinstalled)  1600 W AC (optional)  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	Two fan module slots with fan modules preinstalled  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)
EX4400-24P-S	Two power supply slots  2000 W DC (optional)  You need to order power supplies separately and install them in these slots	Two fan module slots  You need to order front-to-back airflow (AFO) fan modules separately and install them in these slots

## EX4400-24T Switches

### Components on the Front and Rear Panels of EX4400-24T

Figure 8 on page 23 shows the front view of an EX4400-24T switch with 24 RJ-45 ports.

Figure 8: Front View of an EX4400-24T Switch



Figure 9 on page 23 shows the rear view of an EX4400-24T switch with AC power supplies.

Figure 9: Rear View of an EX4400-24T Switch with AC Power Supplies



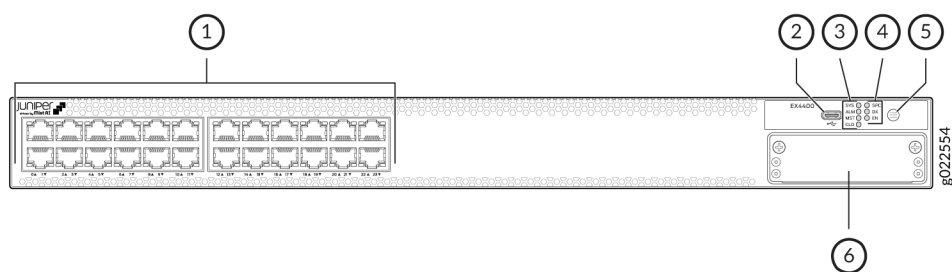
Figure 10 on page 23 shows the rear view of an EX4400-24T switch with DC power supplies.

Figure 10: Rear View of an EX4400-24T Switch with DC Power Supplies



Figure 11 on page 23 shows the components on the front panel of an EX4400-24T switch.

Figure 11: Components on the Front Panel of an EX4400-24T Switch



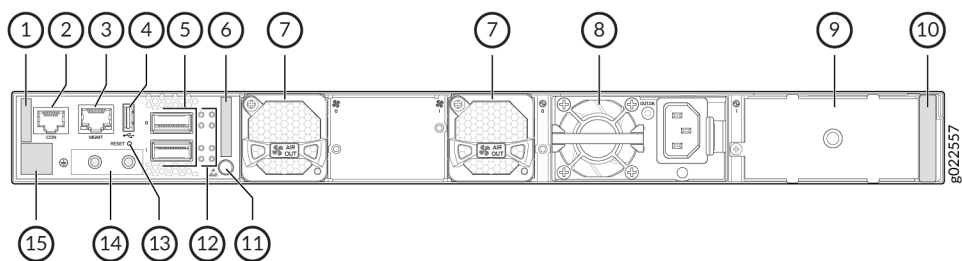
1– 10/100/1000BASE-T ports	4– Port mode LEDs (labeled <b>SPD</b> , <b>DX</b> , and <b>EN</b> )
2– USB-C console port	5– Factory reset/mode button
3– Chassis status LEDs (labeled <b>SYS</b> , <b>ALM</b> , <b>MST</b> , and <b>CLD</b> )	6– Extension module slot

 **NOTE:** We enabled the **CLD** LED feature in Junos OS Release 21.2R1.

EX4400-24T model supports 550-W AC or DC power supplies. You must not install AC and DC power supplies in the same chassis.

Figure 12 on page 24 shows the components on the rear panel of an EX4400-24T switch with an AC power supply.

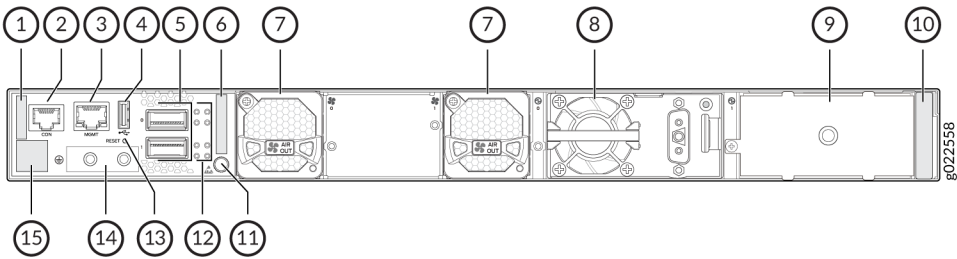
**Figure 12: Components on the Rear Panel of an EX4400-24T Switch with an AC Power Supply**



1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– Electrostatic discharge (ESD) point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– Common Language Equipment Identifier (CLEI) code label	14– Protective earthing terminal
7– Fan module	15– Claim code label
8– 550-W AC power supply	

Figure 13 on page 25 shows the components on the rear panel of an EX4400-24T switch with a DC power supply.

Figure 13: Components on the Rear Panel of an EX4400-24T Switch with a DC Power Supply



1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label
8– 550-W DC power supply	

Table 11 on page 25 lists the components shipped with EX4400-24T switch models.

Table 12 on page 26 describes the physical specifications, ports, and throughput of EX4400-24T switches.

Table 13 on page 28 describes the power supply and cooling system specifications of EX4400-24T switch models

Table 11: EX4400-24T Switch Models, Shipped Components, and First Junos Release

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-24T	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 550-W AC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	21.1R1
EX4400-24T-AFI	Two fan modules with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	A 550-W AC power supply with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	21.1R1

Table 11: EX4400-24T Switch Models, Shipped Components, and First Junos Release (*Continued*)

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400 -24T-DC	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 550-W DC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	21.1R1
EX4400 -24T-DC -AFI	Two fan modules with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	A 550-W DC power supply with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	21.1R1
EX4400 -24T-S	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1

Table 12: EX4400-24T Switches—Physical Specifications, Ports, Throughput

Item	Description	
Chassis Dimensions	Height	1.72 in. (4.37 cm)
	Width	17.39 in. (44.17 cm)  The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).
	Depth	15.71 in. (39.9 cm)—With no power supply, fan module, or extension module installed  16.93 in. (43 cm)—With power supply and fan module installed  17.35 in. (44.07 cm)—With power supply, fan module, and extension module installed

Table 12: EX4400-24T Switches—Physical Specifications, Ports, Throughput *(Continued)*

Item	Description
Weight	<ul style="list-style-type: none"> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24T): 6.5 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24T-AFI): 6.5 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24T-DC): 6.45 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24T-DC-AFI): 6.45 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24T-S): 5.36 kg</li> <li>• Fan module: 0.26 lb (0.12 kg)</li> <li>• 550 W AC power supply: 1.76 lb (0.8 kg)</li> <li>• 550 W DC power supply: 1.65 lb (0.75 kg)</li> <li>• 1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>• 4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>• 4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>
Built-in ports	<p>10/100/1000BASE-T ports: 24</p> <p>100GbE QSFP28 ports: 2</p>
Throughput	<p>324 Gbps—Unidirectional)</p> <p>648 Gbps—Bbidirectional</p>



Table 13: EX4400-24T Switch Models, Power Supplies, Cooling System

Model	Power Supply Specifications	Cooling System Specifications
EX4400-24T	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W AC</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>
EX4400-24T-AFI	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W AC</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>
EX4400-24T-DC	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W DC</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>
EX4400-24T-DC-AFI	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W DC</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>

Table 13: EX4400-24T Switch Models, Power Supplies, Cooling System (Continued)

Model	Power Supply Specifications	Cooling System Specifications
EX4400-24T-S	Two power supply slots  You need to order AC or DC power supplies separately and install them in these slots	Two fan module slots  You need to order front-to-back airflow (AFO) or back-to-front airflow (AFI) fan modules separately and install them in these slots

## EX4400-24X Switch

### Components on the Front and Rear Panels of EX4400-24X Switches

Figure 14 on page 29 shows the front view of an EX4400-24X switch with 24 10GbE small form-factor pluggable (SFP)/small form-factor pluggable plus (SFP+) ports.

Figure 14: Front View of an EX4400-24X Switch



Figure 15 on page 29 shows the rear view of an EX4400-24X switch with an AC power supply.

Figure 15: Rear View of an EX4400-24X Switch with an AC Power Supply



Figure 16 on page 30 shows the components on the front panel of an EX4400-24X switch.

Figure 16: Components on the Front Panel of an EX4400-24X Switch

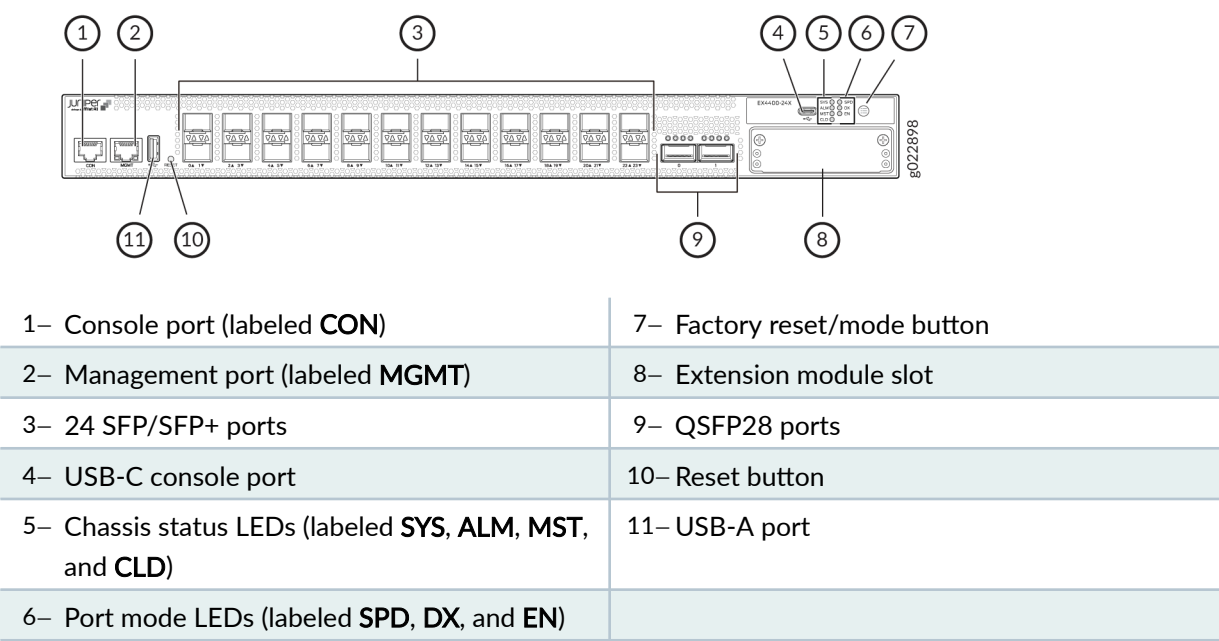


Figure 17 on page 30 shows the components on the rear panel of an EX4400-24X switch with an AC power supply.

Figure 17: Components on the Rear Panel of an EX4400-24X Switch with an AC Power Supply

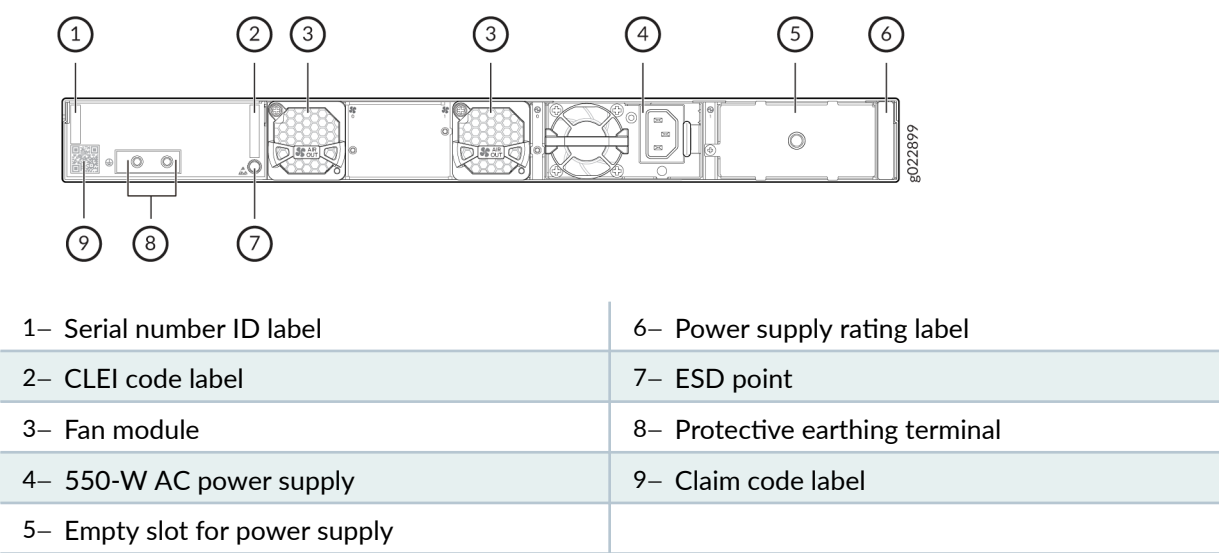
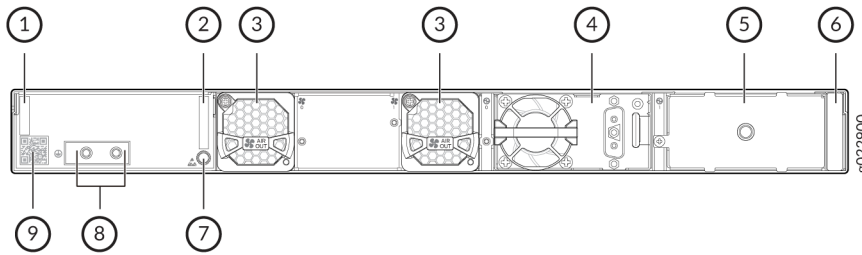


Figure 18 on page 31 shows the components on the rear panel of an EX4400-24X switch with a DC power supply.

**Figure 18: Components on the Rear Panel of an EX4400-24X Switch with a DC Power Supply**



1– Serial number ID label	6– Power supply rating label
2– CLEI code label	7– ESD point
3– Fan module	8– Protective earthing terminal
4– 550-W DC power supply	9– Claim code label
5– Empty slot for power supply	

Table 14 on page 31 lists the components shipped with EX4400-24X switch models.

Table 15 on page 32 describes the physical specifications, ports, and throughput of EX4400-24X switches.

Table 16 on page 34 describes the power supply and cooling system specifications of EX4400-24X switch models

**Table 14: EX4400-24X Switch Models, Shipped Components, and First Junos Release**

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-24X	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 550-W AC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	21.1R1
EX4400-24X-AFI	Two fan modules with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	A 550-W AC power supply with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	23.1R1

Table 14: EX4400-24X Switch Models, Shipped Components, and First Junos Release (*Continued*)

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-24X-DC	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 550-W DC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	23.1R1
EX4400-24X-DC-AFI	Two fan modules with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	A 550-W DC power supply with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	23.1R1

Table 15: EX4400-24X Switches—Physical Specifications, Ports, Throughput

Item	Description	
Chassis Dimensions	Height	1.72 in. (4.37 cm)
	Width	17.39 in. (44.17 cm)  The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).
	Depth	15.71 in. (39.9 cm)—With no power supply, fan module, or extension module installed  16.93 in. (43 cm)—With power supply and fan module installed  17.35 in. (44.07 cm)—With power supply, fan module, and extension module installed

Table 15: EX4400-24X Switches—Physical Specifications, Ports, Throughput *(Continued)*

Item	Description
Weight	<ul style="list-style-type: none"> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24X): 6.7 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24X-S): 5.52 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24X-AFI): 6.7 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24X-DC): 6.65 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24X-DC-AFI): 6.65 kg</li> <li>• Fan module: 0.26 lb (0.12 kg)</li> <li>• 550 W AC power supply: 1.76 lb (0.8 kg)</li> <li>• 550 W DC power supply: 1.65 lb (0.75 kg)</li> <li>• 1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>• 4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>• 4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>
Built-in ports	<p>1/10GbE ports: 24</p> <p>100GbE QSFP28 ports: 2</p>
Throughput	<p>540 Gbps—Unidirectional)</p> <p>1080 Gbps—Bbidirectional</p>

Table 16: EX4400-24X Switch Models, Power Supplies, Cooling System

Model	Power Supply Specifications	Cooling System Specifications
EX4400-24X	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W AC</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>
EX4400-24X-AFI	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W AC</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>
EX4400-24X-DC	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W DC</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>
EX4400-24X-DC-AFI	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W DC</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>

## EX4400-48F Switches

### Components on the Front and Rear Panels of EX4400-48F Switches

Figure 19 on page 35 shows the front view of an EX4400-48F switch with 36 SFP ports and 12 SFP+ ports.

Figure 19: Front View of an EX4400-48F Switch



Figure 20 on page 35 shows the rear view of an EX4400-48F switch with AC power supplies.

Figure 20: Rear View of an EX4400-48F Switch with AC Power Supplies



Figure 21 on page 35 shows the rear view of an EX4400-48F switch with DC power supplies.

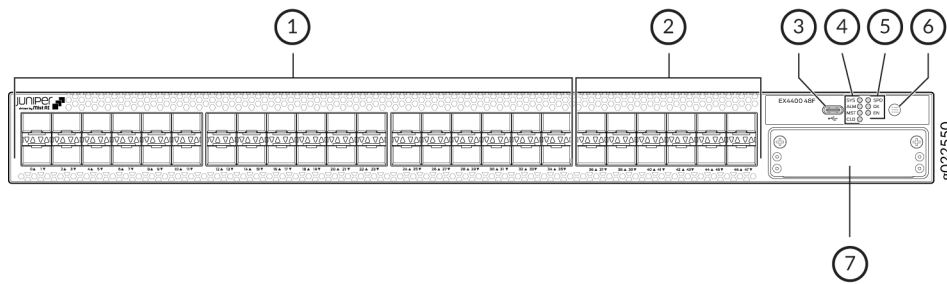
Figure 21: Rear View of an EX4400-48F Switch with DC Power Supplies



Figure 22 on page 36 shows the components on the front panel of an EX4400-48F switch.



**Figure 22: Components on the Front Panel of an EX4400-48F Switch**



1– SFP ports	5– Port mode LEDs (labeled <b>SPD</b> , <b>DX</b> , and <b>EN</b> )
2– SFP+ ports	6– Factory reset/mode button
3– USB-C console port	7– Extension module slot
4– Chassis status LEDs (labeled <b>SYS</b> , <b>ALM</b> , <b>MST</b> , and <b>CLD</b> )	

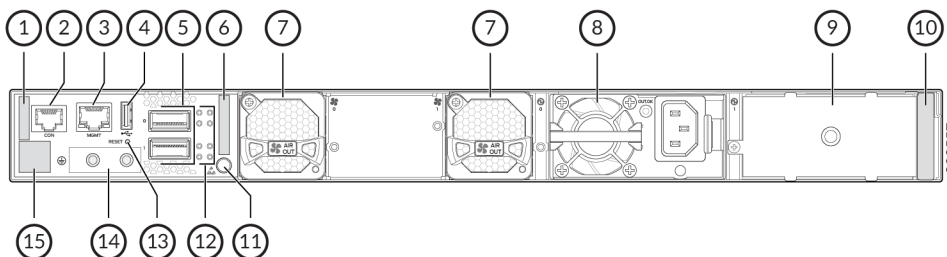


**NOTE:** We enabled the **CLD** LED feature in Junos OS Release 21.2R1.

EX4400-48F model supports 550-W AC or DC power supplies. The EX4400-48F-S switch model supports the 550-W VDC (variable DC) PSU. You must not install a mix of AC, DC, and VDC power supplies in the same chassis.

[Figure 23 on page 36](#) shows the components on the rear panel of an EX4400-48F switch with an AC power supply.

**Figure 23: Components on the Rear Panel of an EX4400-48F Switch with an AC Power Supply**

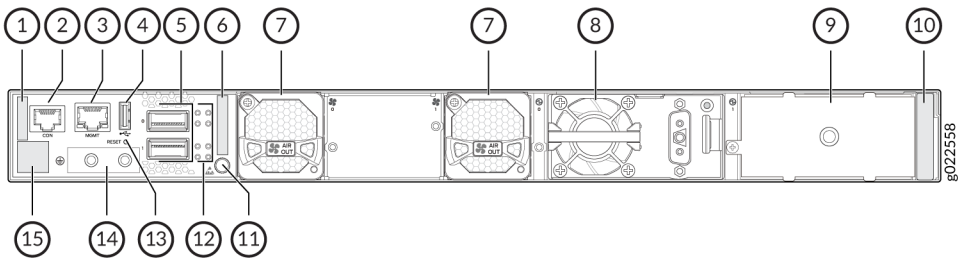


1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button

6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label
8– 550-W AC power supply	

Figure 24 on page 37 shows the components on the rear panel of an EX4400-48F switch with a DC power supply.

Figure 24: Components on the Rear Panel of an EX4400-48F Switch with a DC Power Supply



1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label
8– 550-W DC/VDC power supply	

Table 17 on page 38 lists the components shipped with EX4400-48F switch models.

Table 18 on page 38 describes the physical specifications, ports, and throughput of EX4400-48F switches.

Table 19 on page 41 describes the power supply and cooling system specifications of EX4400-48F switch models

Table 17: EX4400-48F Switch Models, Shipped Components, and First Junos Release

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-48F	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 550-W AC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	21.1R1
EX4400-48F-AFI	Two fan modules with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	A 550-W AC power supply with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	21.1R1
EX4400-48F-DC	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 550-W DC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	21.1R1
EX4400-48F-DC-AFI	Two fan modules with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	A 550-W DC power supply with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	21.1R1
EX4400-48F-S	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1

Table 18: EX4400-48F Switches—Physical Specifications, Ports, Throughput

Item	Description	
Chassis Dimensions	Height	1.72 in. (4.37 cm)

Table 18: EX4400-48F Switches—Physical Specifications, Ports, Throughput *(Continued)*

Item	Description	
	Width	<p>17.39 in. (44.17 cm)</p> <p>The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).</p>
	Depth	<p>15.71 in. (39.9 cm)—With no power supply, fan module, or extension module installed</p> <p>16.93 in. (43 cm)—With power supply and fan module installed</p> <p>17.35 in. (44.07 cm)—With power supply, fan module, and extension module installed</p>

Table 18: EX4400-48F Switches—Physical Specifications, Ports, Throughput *(Continued)*

Item	Description
Weight	<ul style="list-style-type: none"> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-48F): 6.65 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-48F-DC): 6.89 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-48F-S): 5.8 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-48F-AFI): 6.94 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-48F-DC-AFI): 6.89 kg</li> <li>• Fan module: 0.26 lb (0.12 kg)</li> <li>• 550 W AC power supply: 1.76 lb (0.8 kg)</li> <li>• 550 W DC power supply: 1.65 lb (0.75 kg)</li> <li>• 550 W VDC power supply: 1.65 lb (0.75 kg)</li> <li>• 1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>• 4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>• 4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>
Built-in ports	<p>10/100/1000BASE-X ports: 36</p> <p>100/1000/2500/5000/10000BASE-X ports: 12</p> <p><b>NOTE:</b> For ports 36-47 these optics EX-SFP-1FE-[FX/SX/LX] do not support auto negotiation.</p>

Table 18: EX4400-48F Switches—Physical Specifications, Ports, Throughput *(Continued)*

Item	Description
Throughput	348 Gbps—Unidirectional)  696 Gbps—Bbidirectional

Table 19: EX4400-48F Switch Models, Power Supplies, Cooling System

Model	Power Supply Specifications	Cooling System Specifications
EX4400-48F	Two power supply slots with one power supply preinstalled  550 W AC  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	Two fan module slots with fan modules preinstalled  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)
EX4400-48F-AFI	Two power supply slots with one power supply preinstalled  550 W AC  Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	Two fan module slots with fan modules preinstalled  Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)
EX4400-48F-DC	Two power supply slots with one power supply preinstalled  550 W DC  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	Two fan module slots with fan modules preinstalled  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)

Table 19: EX4400-48F Switch Models, Power Supplies, Cooling System (*Continued*)

Model	Power Supply Specifications	Cooling System Specifications
EX4400-48F-DC-AFI	Two power supply slots with one power supply preinstalled  550 W DC  Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	Two fan module slots with fan modules preinstalled  Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)
EX4400-48F-S	Two power supply slots  You need to order AC or DC power supplies separately and install them in these slots	Two fan module slots  You need to order front-to-back airflow (AFO) or back-to-front airflow (AFI) fan modules separately and install them in these slots

## EX4400-48P Switch

### Components on the Front and Rear Panels of an EX4400-48P Switch

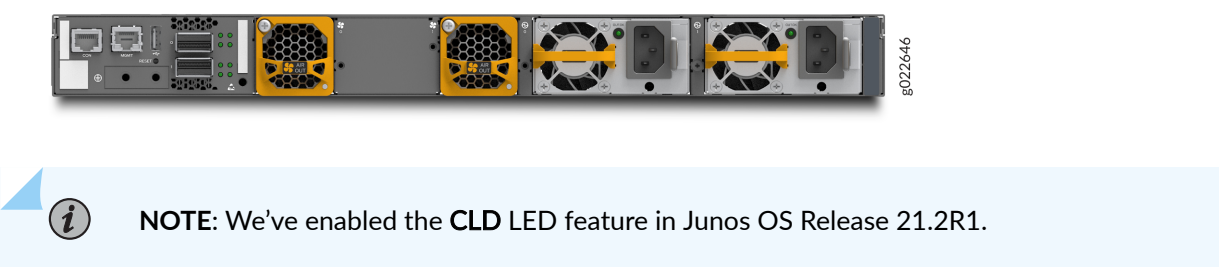
Figure 25 on page 42 shows the front view of an EX4400-48P switch with 48 RJ-45 ports that support PoE-bt.

Figure 25: Front View of an EX4400-48P Switch



Figure 26 on page 43 shows the rear view of an EX4400-48P switch.

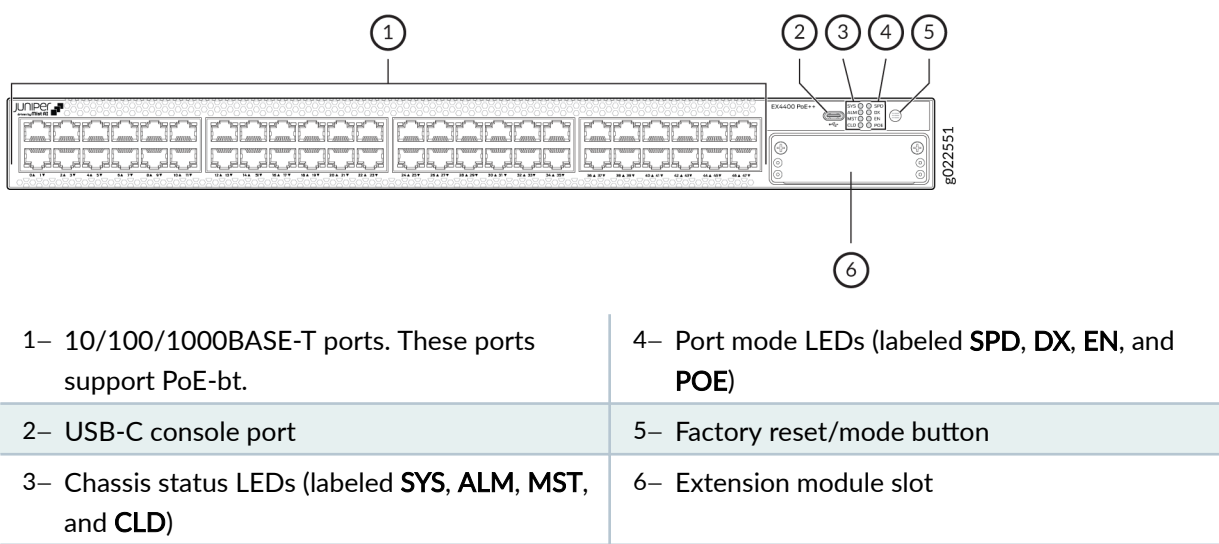
Figure 26: Rear View of an EX4400-48P Switch



**NOTE:** We've enabled the **CLD** LED feature in Junos OS Release 21.2R1.

Figure 27 on page 43 shows the components on the front panel of an EX4400-48P switch.

Figure 27: Components on the Front Panel of an EX4400-48P Switch



1– 10/100/1000BASE-T ports. These ports support PoE-bt.	4– Port mode LEDs (labeled <b>SPD</b> , <b>DX</b> , <b>EN</b> , and <b>POE</b> )
2– USB-C console port	5– Factory reset/mode button
3– Chassis status LEDs (labeled <b>SYS</b> , <b>ALM</b> , <b>MST</b> , and <b>CLD</b> )	6– Extension module slot

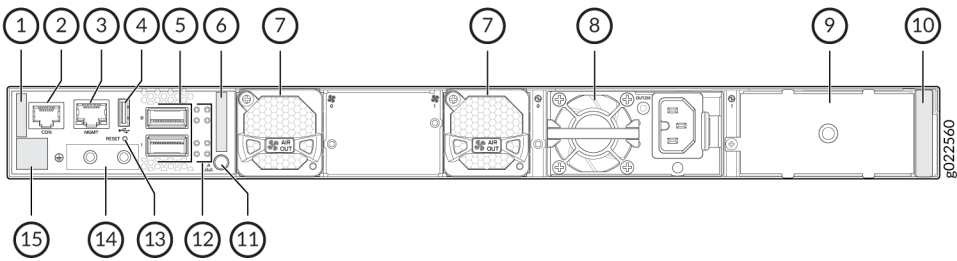


**NOTE:** We enabled the **CLD** LED feature in Junos OS Release 21.2R1.

Figure 28 on page 44 shows the components on the rear panel of an EX4400-48P switch. This model supports 1600-W AC and 2000-W DC power supplies. The 2000-W DC power supply is separately orderable with the spare switch model - EX4400-48P-S.



Figure 28: Components on the Rear Panel of an EX4400-48P Switch



1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label
8– Power supply	

Table 20 on page 44 lists the components shipped with EX4400-48P switch models.

Table 21 on page 45 describes the physical specifications, ports, and throughput of EX4400-48P switches.

Table 22 on page 46 describes the power supply and cooling system specifications of EX4400-48P switch models

Table 20: EX4400-48P Switch Models, Shipped Components, and First Junos Release

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-48P	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 1600-W AC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle).	21.1R1
EX4400-48P-S	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1

Table 21: EX4400-48P Switches—Physical Specifications, Ports, Throughput

Item	Description	
Chassis Dimensions	Height	1.72 in. (4.37 cm)
	Width	17.39 in. (44.17 cm)  The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).
	Depth	15.71 in. (39.9 cm)—With no power supply, fan module, or extension module installed  16.93 in. (43 cm)—With power supply and fan module installed  17.35 in. (44.07 cm)—With power supply, fan module, and extension module installed
Weight	<ul style="list-style-type: none"> <li>Switch with no power supply, fan module, or extension module installed (EX4400-48P): 7.22 kg</li> <li>Switch with no power supply, fan module, or extension module installed (EX4400-48P-S): 5.88 kg</li> <li>Fan module: 0.26 lb (0.12 kg)</li> <li>1600 W AC power supply: 2.0 lb (0.91 kg)</li> <li>2000 W DC power supply: 2.05 lb (0.93 kg)</li> <li>1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>	

Table 21: EX4400-48P Switches—Physical Specifications, Ports, Throughput (*Continued*)

Item	Description
Built-in ports	10-Mbps/100-Mbps/1000-Mbps PoE ports: 48  100GbE QSFP28 ports: 2
PoE Ports (PoE-bt)	48—delivers upto 90 W per port
Throughput	324 Gbps—Unidirectional)  648 Gbps—Bbidirectional

Table 22: EX4400-48P Switch Models, Power Supplies, Cooling System

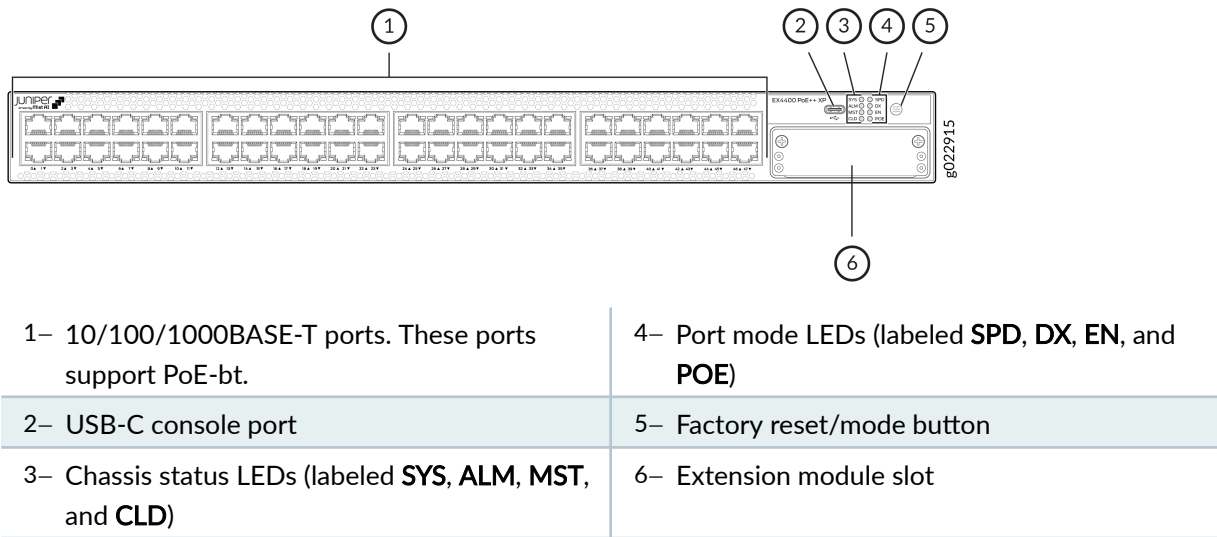
Model	Power Supply Specifications	Cooling System Specifications
EX4400-48P	Two power supply slots with one power supply preinstalled  1600 W AC (optional)  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	Two fan module slots with fan modules preinstalled  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)
EX4400-48P-S	Two power supply slots  2000 DC (optional)  You need to order power supplies separately and install them in these slots	Two fan module slots  You need to order front-to-back airflow (AFO) fan modules separately and install them in these slots

## EX4400-48XP Switch

### Components on the Front and Rear Panels of an EX4400-48XP Switch

The following figure shows the components on the front panel of an EX4400-48XP switch.

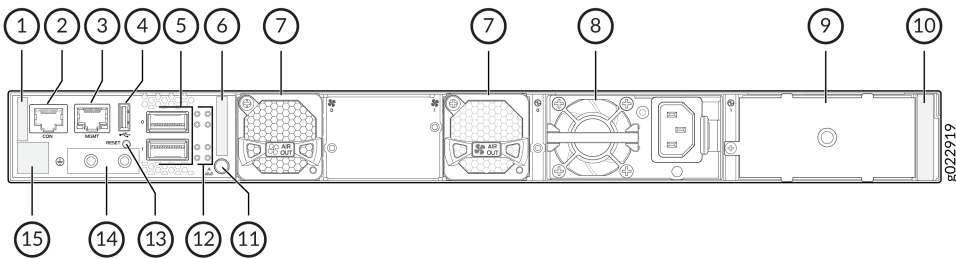
**Figure 29: Components on the Front Panel of an EX4400-48XP Switch**



**NOTE:** We enabled the **CLD** LED feature in Junos OS Release 21.2R1.

The following figure shows the components on the rear panel of an EX4400-48XP switch with AC power supply. This model supports the 2000-W AC and the 2000-W DC power supply. The 2000-W DC power supply is separately orderable with the spare switch model - EX4400-48XP-S.

**Figure 30: Components on the Rear Panel of an EX4400-48XP Switch**



1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label

## 8— Power supply

Table 23: EX4400-48XP Switch Models, Shipped Components, and First Junos Release

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-48XP	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 2000-W AC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	24.2R1-S1
EX4400-48XP-S	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	24.2R1-S1

Table 24: EX4400-48XP Switches—Physical Specifications, Ports, Throughput

Item	Description	
Chassis Dimensions	Height	1.72 in. (4.37 cm)
	Width	17.39 in. (44.17 cm)  The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).
	Depth	15.71 in. (39.9 cm)—With no power supply, fan module, or extension module installed  16.93 in. (43 cm)—With power supply and fan module installed  17.35 in. (44.07 cm)—With power supply, fan module, and extension module installed

Table 24: EX4400-48XP Switches—Physical Specifications, Ports, Throughput *(Continued)*

Item	Description
Weight	<ul style="list-style-type: none"> <li>Switch with no power supply, fan module, or extension module installed (EX4400-48XP): 5.97 kg</li> <li>Fan module: 0.26 lb (0.12 kg)</li> <li>2000 W AC power supply: 2.05 lb (0.93 kg)</li> <li>2000 W DC power supply: 2.05 lb (0.93 kg)</li> <li>1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>
Built-in ports	<p>10-Mbps/100-Mbps/1000-Mbps PoE ports: 48</p> <p>100GbE QSFP28 ports: 2</p>
PoE Ports (PoE-bt)	48—delivers maximum value of 90W per port and an average of 75W per port when all 48 ports are loaded simultaneously using dual PSU at high voltage line.
Throughput	<p>324 Gbps—Unidirectional)</p> <p>648 Gbps—Bbidirectional</p>

Table 25: EX4400-48XP Switch Models, Power Supplies, Cooling System

Model	Power Supply Specifications	Cooling System Specifications
EX4400-48XP	Two power supply slots with one power supply preinstalled  2000 W AC  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	Two fan module slots with fan modules preinstalled  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)
EX4400-48XP-S	Two power supply slots  2000 W DC (optional)  You need to order power supplies separately and install them in these slots	Two fan module slots  You need to order front-to-back airflow (AFO) fan modules separately and install them in these slots

## EX4400-48T Switches

### Components on the Front and Rear Panels of EX4400-48T and EX4400-48P Switches

Figure 31 on page 50 shows the front view of an EX4400-48T switch with 48 RJ-45 ports.

Figure 31: Front View of an EX4400-48T Switch



Figure 32 on page 51 shows the rear view of an EX4400-48T switch with AC power supplies.

Figure 32: Rear View of an EX4400-48T Switch with AC Power Supplies



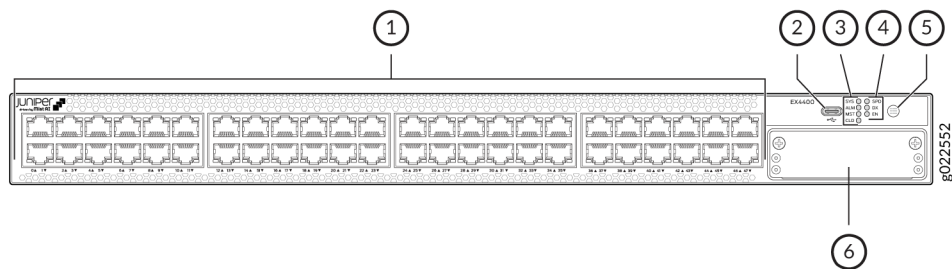
Figure 33 on page 51 shows the rear view of an EX4400-48T switch with DC power supplies.

Figure 33: Rear View of an EX4400-48T Switch with DC Power Supplies



Figure 34 on page 51 shows the components on the front panel of an EX4400-48T switch.

Figure 34: Components on the Front Panel of an EX4400-48T Switch



1– 10/100/1000BASE-T ports	4– Port mode LEDs (labeled <b>SPD</b> , <b>DX</b> , and <b>EN</b> )
2– USB-C console port	5– Factory reset/mode button
3– Chassis status LEDs (labeled <b>SYS</b> , <b>ALM</b> , <b>MST</b> , and <b>CLD</b> )	6– Extension module slot

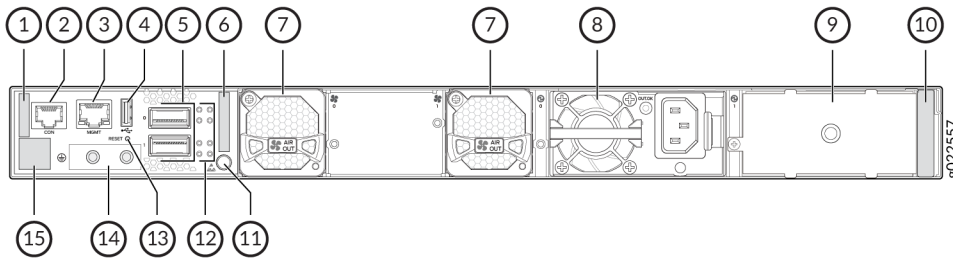
**NOTE:** We enabled the **CLD** LED feature in Junos OS Release 21.2R1.

EX4400-48T model supports 550-W AC or DC power supplies. You must not install AC and DC power supplies in the same chassis.

Figure 35 on page 52 shows the components on the rear panel of an EX4400-48T switch with an AC power supply.



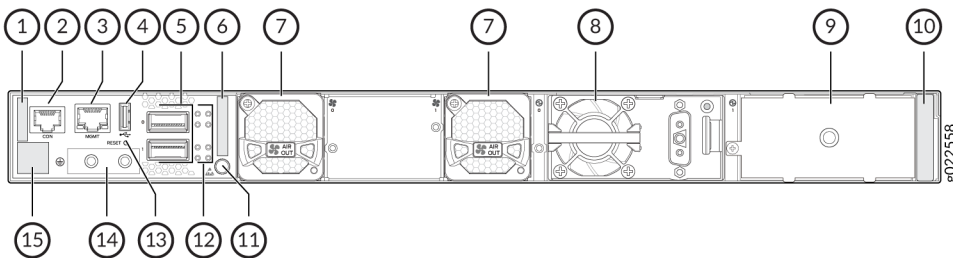
**Figure 35: Components on the Rear Panel of an EX4400-48T Switch with an AC Power Supply**



1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label
8– 550-W AC power supply	

Figure 36 on page 52 shows the components on the rear panel of an EX4400-48T switch with a DC power supply.

**Figure 36: Components on the Rear Panel of an EX4400-48T Switch with a DC Power Supply**



1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label
8– 550-W DC power supply	

Table 26 on page 53 lists the components shipped with EX4400-48T switch models.

Table 27 on page 54 describes the physical specifications, ports, and throughput of EX4400-48T switches.

Table 28 on page 56 describes the power supply and cooling system specifications of EX4400-48T switch models

**Table 26: EX4400-48T Switch Models, Shipped Components, and First Junos Release**

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-48T	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 550-W AC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	21.1R1
EX4400-48T-AFI	Two fan modules with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	A 550-W AC power supply with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	21.1R1
EX4400-48T-DC	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 550-W DC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	21.1R1
EX4400-48T-DC-AFI	Two fan modules with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	A 550-W DC power supply with back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)	21.1R1
EX4400-48T-S	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1

Table 27: EX4400-48T Switches—Physical Specifications, Ports, Throughput

Item	Description	
Chassis Dimensions	Height	1.72 in. (4.37 cm)
	Width	17.39 in. (44.17 cm)  The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).
	Depth	15.71 in. (39.9 cm)—With no power supply, fan module, or extension module installed  16.93 in. (43 cm)—With power supply and fan module installed  17.35 in. (44.07 cm)—With power supply, fan module, and extension module installed

Table 27: EX4400-48T Switches—Physical Specifications, Ports, Throughput *(Continued)*

Item	Description
Weight	<ul style="list-style-type: none"> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-48T): 6.71 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-48T-AFI): 6.71 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-48T-DC): 6.66 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-48T-DC-AFI): 6.66 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-48T-S): 5.58 kg</li> <li>• Fan module: 0.26 lb (0.12 kg)</li> <li>• 550 W AC power supply: 1.76 lb (0.8 kg)</li> <li>• 550 W DC power supply: 1.65 lb (0.75 kg)</li> <li>• 1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>• 4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>• 4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>
Built-in ports	<p>10/100/1000BASE-T ports: 48</p> <p>100GbE QSFP28 ports: 2</p>
Throughput	<p>348 Gbps—Unidirectional)</p> <p>696 Gbps—Bbidirectional</p>

Table 28: EX4400-48T Switch Models, Power Supplies, Cooling System

Model	Power Supply Specifications	Cooling System Specifications
EX4400-48T	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W AC</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>
EX4400-48T-AFI	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W AC</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>
EX4400-48T-DC	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W DC</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)</p>
EX4400-48T-DC-AFI	<p>Two power supply slots with one power supply preinstalled</p> <p>550 W DC</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>	<p>Two fan module slots with fan modules preinstalled</p> <p>Back-to-front airflow (indicated by the <b>AIR IN</b> label and the blue handle)</p>

Table 28: EX4400-48T Switch Models, Power Supplies, Cooling System (Continued)

Model	Power Supply Specifications	Cooling System Specifications
EX4400-48T-S	Two power supply slots  You need to order AC or DC power supplies separately and install them in these slots	Two fan module slots  You need to order front-to-back airflow (AFO) or back-to-front airflow (AFI) fan modules separately and install them in these slots

## EX4400-24MP Switch

### Components on the Front and Rear Panels of EX4400-24MP Switches

Figure 37 on page 57 shows the front view of an EX4400-24MP switch with 24 RJ-45 ports that support PoE-bt.

Figure 37: Front View of an EX4400-24MP Switch



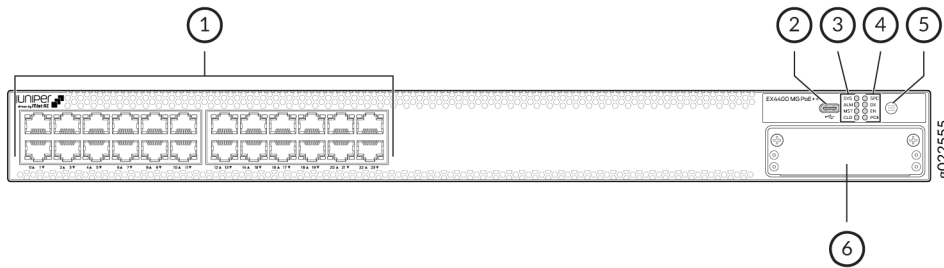
Figure 38 on page 57 shows the rear view of an EX4400-24MP switch.

Figure 38: Rear View of an EX4400-24MP Switch



Figure 39 on page 58 shows the components on the front panel of an EX4400-24MP switch.

**Figure 39: Components on the Front Panel of an EX4400-24MP Switch**



1– 100-Mbps/1-Gbps/2.5-Gbps/5-Gbps/10-Gbps RJ-45 ports. These ports support PoE-bt.	4– Port mode LEDs (labeled <b>SPD</b> , <b>DX</b> , <b>EN</b> , and <b>POE</b> )
2– USB-C console port	5– Factory reset/mode button
3– Chassis status LEDs (labeled <b>SYS</b> , <b>ALM</b> , <b>MST</b> , and <b>CLD</b> )	6– Extension module slot

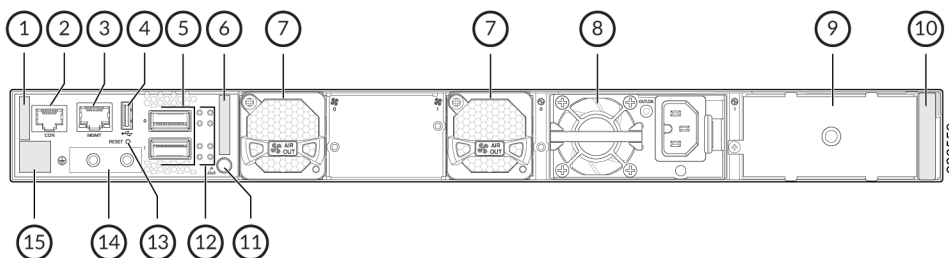
Figure 40 on page 58 shows the components on the rear panel of an EX4400-24MP switch. We ship the switch with one 1050-W power supply by default. You can order an additional power supply separately. The model also supports the 2000-W DC PSU, which you can order separately with the spare switch model- EX4400-24MP-S.

If you have Junos OS Release 22.3R1 or later installed, the switch supports the 1600-W AC power supply.



**NOTE:** You must install only one model of power supply in a chassis. Do not mix different models.

**Figure 40: Components on the Rear Panel of an EX4400-24MP Switch**



1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point

4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label
8– Power supply	

Table 29 on page 59 lists the components shipped with EX4400-24MP switch models.

Table 30 on page 59 describes the physical specifications, ports, and throughput of EX4400-24MP switches.

Table 31 on page 61 describes the power supply and cooling system specifications of EX4400-24MP switch models

**Table 29: EX4400-24MP Switch Models, Shipped Components, and First Junos Release**

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-24MP	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 1050-W AC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	21.1R1
EX4400-24MP-S	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1

**Table 30: EX4400-24MP Switches—Physical Specifications, Ports, Throughput**

Item	Description	
Chassis Dimensions	Height	1.72 in. (4.37 cm)
	Width	17.39 in. (44.17 cm)  The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).



Table 30: EX4400-24MP Switches—Physical Specifications, Ports, Throughput *(Continued)*

Item	Description	
	Depth	<p>15.71 in. (39.9 cm)—With no power supply, fan module, or extension module installed</p> <p>16.93 in. (43 cm)—With power supply and fan module installed</p> <p>17.35 in. (44.07 cm)—With power supply, fan module, and extension module installed</p>
Weight	<ul style="list-style-type: none"> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24MP): 7.07 kg</li> <li>• Switch with no power supply, fan module, or extension module installed (EX4400-24MP-S): 6.06 kg</li> <li>• Fan module: 0.26 lb (0.12 kg)</li> <li>• 1050 W AC power supply: 1.98 lb (0.9 kg)</li> <li>• 1600 W AC power supply: 2.0 lb (0.91 kg)</li> <li>• 2000 W DC power supply: 2.05 lb (0.93 kg)</li> <li>• 1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>• 4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>• 4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>	
Built-in ports	100-Mbps/1-Gbps/2.5-Gbps/5-Gbps/10-Gbps ports: 24	
PoE Ports (PoE-bt)	24—delivers upto 90 W per port	

Table 30: EX4400-24MP Switches—Physical Specifications, Ports, Throughput (*Continued*)

Item	Description
Throughput	540 Gbps—Unidirectional  1080 Gbps—Bbidirectional

Table 31: EX4400-24MP Switch Models, Power Supplies, Cooling System

Model	Power Supply Specifications	Cooling System Specifications
EX4400-24MP	Two power supply slots with one power supply preinstalled  1050 W AC (preinstalled)  1600 W AC (optional)  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	Two fan module slots with fan modules preinstalled  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)
EX4400-24MP-S	Two power supply slots  2000 W DC (optional)  You need to order power supplies separately and install them in these slots	Two fan module slots  You need to order front-to-back airflow (AFO) fan modules separately and install them in these slots

## EX4400-48MP Switch

### Components on the Front and Rear Panels of EX4400-48MP Switches

Figure 41 on page 62 shows the front view of an EX4400-48MP switch with 48 RJ-45 ports that support PoE-bt.

Figure 41: Front View of an EX4400-48MP Switch



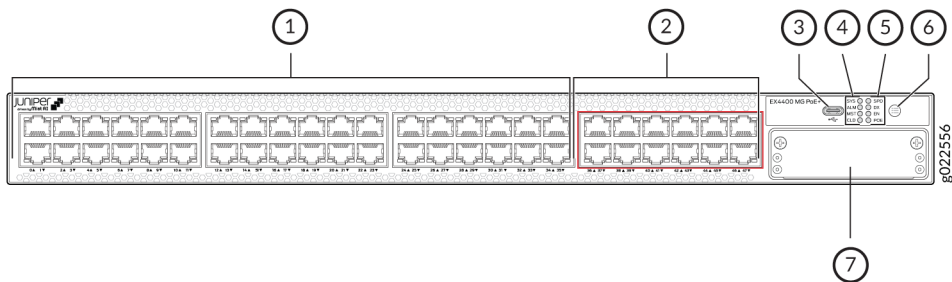
Figure 42 on page 62 shows the rear view of an EX4400-48MP switch.

Figure 42: Rear View of an EX4400-48MP Switch



Figure 43 on page 62 shows the components on the front panel of an EX4400-48MP switch.

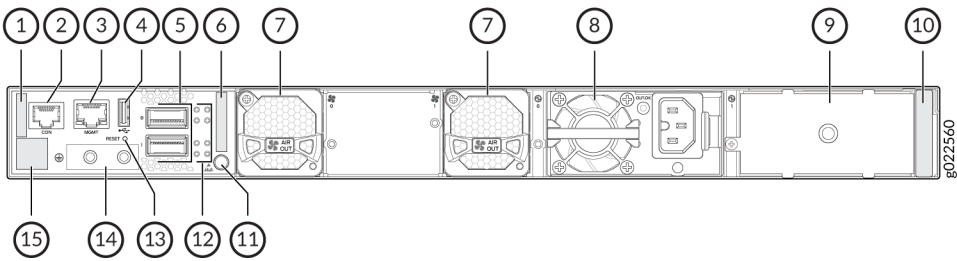
Figure 43: Components on the Front Panel of an EX4400-48MP Switch



1– 100-Mbps/1-Gbps/2.5-Gbps RJ-45 ports. These ports support PoE-bt.	5– Port mode LEDs (labeled <b>SPD</b> , <b>DX</b> , <b>EN</b> , and <b>POE</b> )
2– 100-Mbps/1-Gbps/2.5-Gbps/5-Gbps/10-Gbps RJ-45 ports. These ports support PoE-bt.	6– Factory reset/mode button
3– USB-C console port	7– Extension module slot
4– Chassis status LEDs (labeled <b>SYS</b> , <b>ALM</b> , <b>MST</b> , and <b>CLD</b> )	

Figure 44 on page 63 shows the components on the rear panel of an EX4400-48MP switch. This model supports the 1600-W AC power supply and the 2000-W DC power supply. The 2000-W DC power supply is separately orderable with the spare switch model - EX4400-48MP-S.

Figure 44: Components on the Rear Panel of an EX4400-48MP Switch



1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label
8– Power supply	

Table 32 on page 63 lists the components shipped with EX4400-48MP switch models.

Table 33 on page 64 describes the physical specifications, ports, and throughput of EX4400-48MP switches.

Table 34 on page 65 describes the power supply and cooling system specifications of EX4400-48MP switch models

Table 32: EX4400-48MP Switch Models, Shipped Components, and First Junos Release

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-48MP	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 1600-W AC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	21.1R1
EX4400-48MP-S	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1

Table 33: EX4400-48MP Switches—Physical Specifications, Ports, Throughput

Item	Description	
Chassis Dimensions	Height	1.72 in. (4.37 cm)
	Width	17.39 in. (44.17 cm)  The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).
	Depth	15.71 in. (39.9 cm)—With no power supply, fan module, or extension module installed  16.93 in. (43 cm)—With power supply and fan module installed  17.35 in. (44.07 cm)—With power supply, fan module, and extension module installed
Weight	<ul style="list-style-type: none"> <li>Switch with no power supply, fan module, or extension module installed (EX4400-48MP): 7.35 kg</li> <li>Switch with no power supply, fan module, or extension module installed (EX4400-48MP-S): 6.34 kg</li> <li>Fan module: 0.26 lb (0.12 kg)</li> <li>1600 W AC power supply: 2.0 lb (0.91 kg)</li> <li>2000 W DC power supply: 2.05 lb (0.93 kg)</li> <li>1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>	

Table 33: EX4400-48MP Switches—Physical Specifications, Ports, Throughput (*Continued*)

Item	Description
Built-in ports	100-Mbps/1-Gbps/2.5-Gbps/5-Gbps/10-Gbps PoE ports: 12 100-Mbps/1-Gbps/2.5-Gbps PoE ports: 36
PoE Ports (PoE-bt)	48—delivers upto 90 W per port
Throughput	510 Gbps—Unidirectional) 1020 Gbps—Bidirectional

Table 34: EX4400-48MP Switch Models, Power Supplies, Cooling System

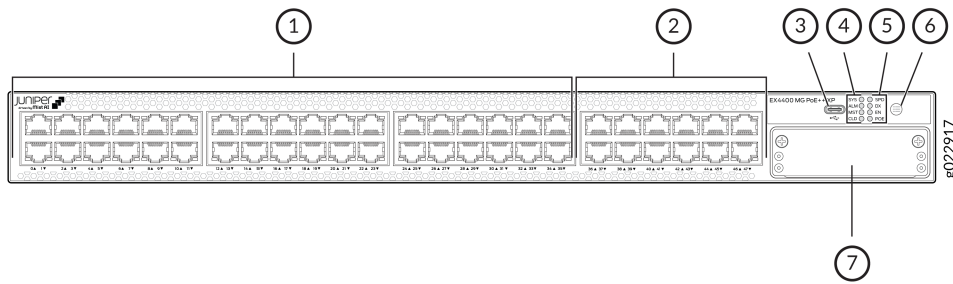
Model	Power Supply Specifications	Cooling System Specifications
EX4400-48MP	Two power supply slots with one power supply preinstalled 1600 W AC (optional) Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	Two fan module slots with fan modules preinstalled Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)
EX4400-48MP-S	Two power supply slots 2000 W DC (optional) You need to order power supplies separately and install them in these slots	Two fan module slots You need to order front-to-back airflow (AFO) fan modules separately and install them in these slots

## EX4400-48MXP Switch

### Components on the Front and Rear Panels of EX4400-48MXP Switches

The following figure shows the components on the front panel of an EX4400-48MXP switch.

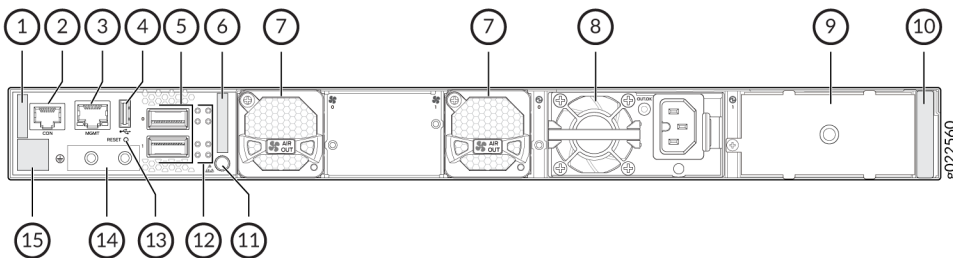
**Figure 45: Components on the Front Panel of an EX4400-48MXP Switch**



1– 100-Mbps/1-Gbps/2.5-Gbps RJ-45 ports. These ports support PoE-bt.	5– Port mode LEDs (labeled <b>SPD</b> , <b>DX</b> , <b>EN</b> , and <b>POE</b> )
2– 100-Mbps/1-Gbps/2.5-Gbps/5-Gbps/10-Gbps RJ-45 ports. These ports support PoE-bt.	6– Factory reset/mode button
3– USB-C console port	7– Extension module slot
4– Chassis status LEDs (labeled <b>SYS</b> , <b>ALM</b> , <b>MST</b> , and <b>CLD</b> )	

The following figure shows the components on the rear panel of an EX4400-48MXP switch. This model supports 2000-W AC and 2000-W DC power supplies. The 2000-W DC power supply is separately orderable with the spare switch model - EX4400-48MXP-S.

**Figure 46: Components on the Rear Panel of an EX4400-48MXP Switch**



1– Serial number ID label	9– Empty slot for power supply
2– Console port (labeled <b>CON</b> )	10– Power supply rating label
3– Management port (labeled <b>MGMT</b> )	11– ESD point
4– USB-A port	12– QSFP28 port LEDs
5– QSFP28 ports	13– Reset button
6– CLEI code label	14– Protective earthing terminal
7– Fan module	15– Claim code label

## 8– Power supply

Table 35: EX4400-48MXP Switch Models, Shipped Components, and First Junos Release

Model Number	Fan Modules	Power Supply	First Junos OS Release
EX4400-48MXP	Two fan modules with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	A 2000-W AC power supply with front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	24.2R1-S1
EX4400-48MXP-S	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	24.2R1-S1

Table 36: EX4400-48MXP Switches—Physical Specifications, Ports, Throughput

Item	Description	
Chassis Dimensions	Height	1.72 in. (4.37 cm)
	Width	17.39 in. (44.17 cm)  The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).
	Depth	15.71 in. (39.9 cm)—With no power supply, fan module, or extension module installed  16.93 in. (43 cm)—With power supply and fan module installed  17.35 in. (44.07 cm)—With power supply, fan module, and extension module installed



Table 36: EX4400-48MXP Switches—Physical Specifications, Ports, Throughput (*Continued*)

Item	Description
Weight	<ul style="list-style-type: none"> <li>Switch with no power supply, fan module, or extension module installed (EX4400-48MXP): 7.35 kg</li> <li>Fan module: 0.26 lb (0.12 kg)</li> <li>2000 W AC power supply: 2.05 lb (0.93 kg)</li> <li>2000 W DC power supply: 2.05 lb (0.93 kg)</li> <li>1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>
Built-in ports	<p>100-Mbps/1-Gbps/2.5-Gbps/5-Gbps/10-Gbps PoE ports: 12</p> <p>100-Mbps/1-Gbps/2.5-Gbps PoE ports: 36</p> <p>100GbE QSFP28 ports: 2</p>
PoE Ports (PoE-bt)	48—delivers up to maximum value of 90W per port and an average of 75W per port when all 48 ports are loaded simultaneously using dual PSU at high voltage line.
Throughput	<p>510 Gbps—Unidirectional)</p> <p>1020 Gbps—Bidirectional</p>

Table 37: EX4400-48MXP Switch Models, Power Supplies, Cooling System

Model	Power Supply Specifications	Cooling System Specifications
EX4400-48MXP	Two power supply slots with one power supply preinstalled  2000 W AC  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)	Two fan module slots with fan modules preinstalled  Front-to-back airflow (indicated by the <b>AIR OUT</b> label and the orange handle)
EX4400-48MXP-S	Two power supply slots  2000 W DC (optional)  You need to order power supplies separately and install them in these slots	Two fan module slots  You need to order front-to-back airflow (AFO) fan modules separately and install them in these slots



**NOTE:** EX4400 could be stuck during reboot, if one end of a twisted pair cable is connected to primary console port (RJ45) and the other end is left dangling/unconnected. This is noticed with twisted pair cables of length 15ft and above only. And no issues noticed when the box is up and running even if there is a dangling twisted pair cable. So, it is not recommended to use twisted pair cable of length 15 ft and above. And if it is unavoidable to use twisted pair cable of length 15 ft and above, atleast ensure that both ends of the the cable are connected or both ends disconnected. Connecting one end of such a cable to the switch and leaving the other end dangling can cause this issue during reboot.

## EX4400 Chassis

### IN THIS SECTION

● Chassis Physical Specifications for EX4400 Switches | 70

- Chassis Status LEDs on EX4400 Switches | 73
- LEDs on the Management Port on EX4400 Switches | 75
- LEDs on the RJ-45, SFP, and SFP+ Network Ports, QSFP28 Ports, and Extension Module Ports on EX4400 Switches | 77

## Chassis Physical Specifications for EX4400 Switches

The EX4400 switch chassis is a rigid sheet-metal structure that houses all components of the switch. [Table 38 on page 70](#) summarizes the physical specifications of the EX4400 switch chassis.

**Table 38: Physical Specifications of the EX4400 Switch Chassis**

Description	Value
Chassis height	1.72 in. (4.37 cm)
Chassis width	17.39 in. (44.17 cm)  The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).
Chassis depth	<ul style="list-style-type: none"> <li>• With no power supply, fan module, or extension module installed: 15.71 in. (39.9 cm)</li> <li>• With power supply and fan module installed: 16.93 in. (43 cm)</li> </ul> <p>The cables and power supply cords you connect to the switch extend the depth.</p> <ul style="list-style-type: none"> <li>• With power supply, fan module, and extension module installed: 17.35 in. (44.07 cm)</li> </ul>

**Table 38: Physical Specifications of the EX4400 Switch Chassis (*Continued*)**

Description	Value
Weight	<ul style="list-style-type: none"> <li>Switch with no power supply, fan module, or extension module installed: 12–13.67 lb (5.43–6.2 kg)</li> <li>Fan module: 0.26 lb (0.12 kg)</li> <li>550 W AC power supply: 1.76 lb (0.8 kg)</li> <li>550 W DC power supply: 1.65 lb (0.75 kg)</li> <li>550 W VDC power supply: 1.65 lb (0.75 kg)</li> <li>1050 W AC power supply: 1.98 lb (0.9 kg)</li> <li>1600 W AC power supply: 2 lb (0.91 kg)</li> <li>2000 W AC power supply: 2.05 lb (0.93 kg)</li> <li>2000 W DC power supply: 2.05 lb (0.93 kg)</li> <li>1x100GbE QSFP28 extension module (model number: EX4400-EM-1C): 0.26 lb (0.12 kg)</li> <li>4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg)</li> <li>4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg)</li> </ul> <p>We ship the switch preinstalled with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot.</p>

**Table 39: Physical Specifications of the EX4400 Fan FRU**

Description	Value
Width	1.65 in (4.18 cm)
Height	1.65 in (4.18 cm)

**Table 39: Physical Specifications of the EX4400 Fan FRU (Continued)**

Description	Value
Depth	4.55 in (11.57 cm)

**Table 40: Physical Specifications of the EX4400 PSUs**

Description	Value
Width	3.27 in (8.3 cm)
Height	1.59 in (4.04 cm)
Depth	8.88 in (22.56 cm) 550-W VDC PSU - 9.48 in (24 cm)

You can mount an EX4400 switch:

- On a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting brackets provided with the switch.
- Flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit.
- In a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit.
- On a desk or other level surface by using the rubber feet provided with the switch.
- On a wall by using a separately orderable wall mount kit.

To know the part numbers for ordering the separately orderable mounting kits, see the [EX4400 Switches Datasheet](#).

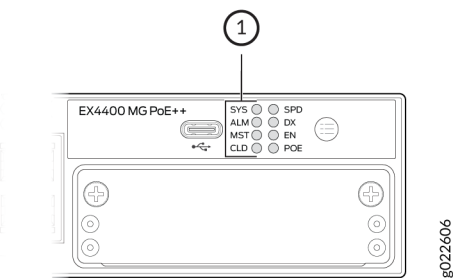
See "[EX4400 Models and Specifications](#)" on [page 17](#) to know more about the EX4400 models and their specifications.

## Chassis Status LEDs on EX4400 Switches

Each EX4400 switch has four chassis status LEDs (labeled **SYS**, **ALM**, **MST**, and **CLD**) on the right-hand side of the front panel (see [Figure 47 on page 73](#)).

For information on the blink patterns of the CLD LED, which provide the cloud connection status of the switch, see [Cloud-Ready LED Blink Patterns](#), or see [Cloud-Ready Connection Process](#), to understand how the cloud connection works.

Figure 47: Chassis Status LEDs in EX4400 Switches



1– Chassis status LEDs

[Table 41 on page 73](#) describes the chassis status LEDs labeled **SYS**, **ALM**, and **MST** on an EX4400 switch, their colors and states, and the status they indicate. You can view the colors of the LEDs remotely through the CLI by issuing the `show chassis led operational` mode command. All LEDs can be lit simultaneously.

Table 41: SYS, ALM, and MST Chassis Status LEDs on EX4400 Switches

LED Label	Color	State and Description
SYS	Green	<ul style="list-style-type: none"><li>On steadily—Junos OS for EX Series switches is loaded on the switch.</li><li>Blinking—The switch is booting.</li></ul>
	Unlit	The switch is powered off or is halted.

Table 41: SYS, ALM, and MST Chassis Status LEDs on EX4400 Switches (*Continued*)

LED Label	Color	State and Description
ALM	Red	<p>There is a major hardware fault, such as a temperature alarm or a power failure alarm, and the switch is halted.</p> <p>A major alarm indicates a critical error condition that requires immediate attention (see <a href="#">"Chassis Component Alarm Conditions on EX4400 Switches" on page 283</a>).</p>
	Amber	<p>There is a minor alarm, such as a software or a hardware error. Power off the switch and then power it on. Monitor the switch to see whether it is working properly.</p> <p>A minor alarm indicates a noncritical condition that requires monitoring or maintenance. A minor alarm that is left unchecked might cause interruption in service or performance degradation.</p>
	Unlit	There is no alarm or the switch is halted.
MST	Green	<p>In a standalone switch:</p> <ul style="list-style-type: none"> <li>On steadily—The switch is functioning normally.</li> <li>Off—The switch is powered off or is halted.</li> </ul>
		<p>In a Virtual Chassis configuration:</p> <ul style="list-style-type: none"> <li>On steadily—The switch is the primary switch in the Virtual Chassis configuration.</li> <li>Blinking—The switch is functioning as the backup switch in the Virtual Chassis configuration.</li> <li>Off—The switch is a linecard member in the Virtual Chassis configuration or the switch is halted.</li> </ul>



**NOTE:** Issuing request system power-off doesn't power-off the **SYS** LED, which continues to blink. It is because this command will power-off only the CPU board. As CPU board

asserts platform reset during shutdown process, it will trigger **SYS** LED to enter default state of blinking. This is expected behavior.

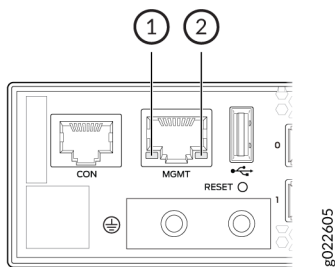


**NOTE:** In a VC involving EX4400-48XP or EX4400-48MXP, if request system power-off member *member number of the EX4400-48XP or EX4400-48MXP* is issued to power-off the FPC; all of its LEDs become unlit as expected but the **SYS** LED continues to blink, the **CLD** LED continues to glow (Green), and the Virtual Chassis port LEDs at the rear of the switch will continue to glow (Amber).

## LEDs on the Management Port on EX4400 Switches

The management port—labeled **MGMT**—has two LEDs that indicate link activity and status of the port (see [Figure 48 on page 75](#) and [Figure 49 on page 76](#)). The management port is on the rear panel of EX4400 switch models except the EX4400-24X model. The management port is on the front panel of the EX4400-24X model.

**Figure 48: LEDs on the Management Port on EX4400 Switches Except the EX4400-24X Model**

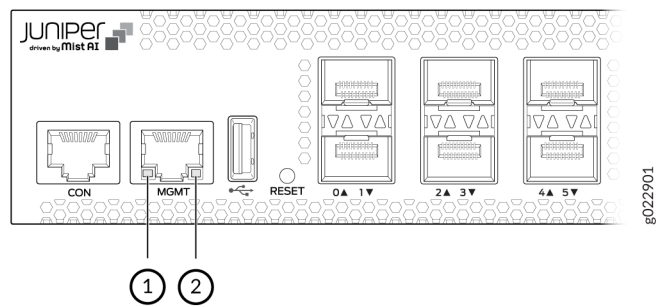


1– Link activity LED

2– Status LED



Figure 49: LEDs on the Management Port on the EX4400-24X Model



- 1– Link activity LED
- 2– Status LED

Table 42 on page 76 describes the LEDs.

Table 42: LEDs on the Management Port on EX4400 Switches

LED	State and Description
Link activity	<ul style="list-style-type: none"><li>On steadily—The port and the link are active, but there is no link activity.</li><li>Blinking—The port and the link are active, and there is link activity.</li><li>Off—The port is not active.</li></ul>
Status	<p>Indicates the speed:</p> <ul style="list-style-type: none"><li>On steadily—Link speed is 1000 Mbps.</li><li>Blinking—Link speed is 100 Mbps.</li><li>Off—Link speed is 10 Mbps.</li></ul>

## LEDs on the RJ-45, SFP, and SFP+ Network Ports, QSFP28 Ports, and Extension Module Ports on EX4400 Switches

### IN THIS SECTION

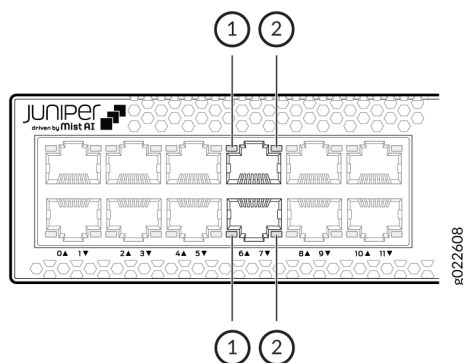
- [LEDs on the Network Ports | 77](#)
- [LEDs on the QSFP28 Ports | 82](#)
- [LEDs on the Extension Module Ports | 85](#)

The RJ-45, small form-factor pluggable (SFP), and small form-factor pluggable plus (SFP+) network ports, SFP+, SFP28, and QSFP28 extension module ports, and QSFP28 ports on EX4400 switches have LEDs that show the link activity and status of the port.

### LEDs on the Network Ports

[Figure 50 on page 77](#) shows the LEDs on the RJ-45 network ports on EX4400-24T, EX4400-24P, EX4400-24MP, EX4400-48T, EX4400-48P, EX4400-48XP, EX4400-48MXP and EX4400-48MP switches. [Figure 51 on page 78](#) shows the LEDs on the SFP+ network ports on EX4400-24X switches. [Figure 52 on page 78](#) shows the LEDs on the SFP network ports on EX4400-48F switches. [Figure 53 on page 79](#) shows the LEDs on the SFP+ network ports on EX4400-48F switches.

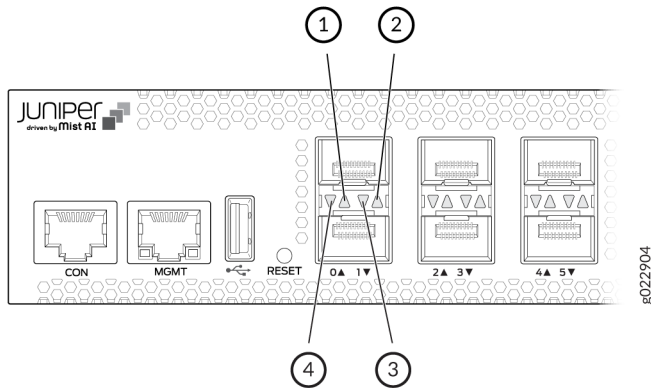
**Figure 50: LEDs on the RJ-45 Network Ports on EX4400-24T, EX4400-24P, EX4400-24MP, EX4400-48T, EX4400-48P, and EX4400-48MP Switches**



1– Link activity LED

2– Status LED

**Figure 51: LEDs on the SFP+ Network Ports on EX4400-24X Switches**



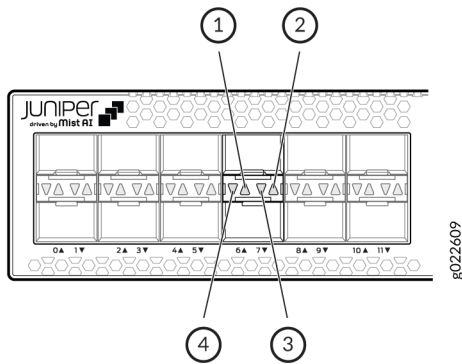
1– Link activity LED for the upper port

3– Status LED for the lower port

2– Status LED for the upper port

4– Link activity LED for the lower port

**Figure 52: LEDs on the SFP Network Ports on EX4400-48F Switches**



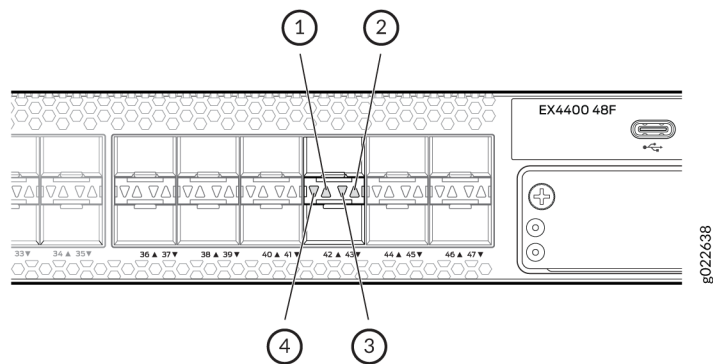
1– Link activity LED for the upper port

3– Status LED for the lower port

2– Status LED for the upper port

4– Link activity LED for the lower port

Figure 53: LEDs on the SFP+ Network Ports on EX4400-48F Switches



1– Link activity LED for the upper port	3– Status LED for the lower port
2– Status LED for the upper port	4– Link activity LED for the lower port

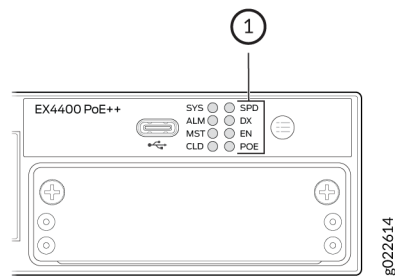
Table 43 on page 79 describes the link activity LED on the network ports.

Table 43: Link Activity LED on the Network Ports

Color	State and Description
Green	<ul style="list-style-type: none"><li>On steadily—The port and the link are active, but there is no link activity.</li><li>Blinking—The port and the link are active, and there is link activity.</li><li>Off—The port is not active.</li></ul>

EX4400 switches have network port mode LEDs labeled **SPD**, **DX**, and **EN** on the right-hand side of the front panel; models with ports that support PoE-bt have an additional mode LED labeled **POE** (see [Figure 54 on page 80](#)). These LEDs indicate the status of the network ports. Use the mode button on the right-hand side of the front panel to toggle the status LEDs to show the different port parameters for the network ports; the port parameter is indicated by the LED that is lit. [Table 44 on page 80](#) describes the status LEDs.

Figure 54: Port Mode LEDs on EX4400 Switches



1– Port Mode LEDs

Table 44: Status LEDs on the RJ-45, SFP, and SFP+ Network Ports

LED	Color	State and Description
SPD	Green	<p>Indicates the speed at which the RJ-45, SFP, and SFP+ network ports operate.</p> <ul style="list-style-type: none"><li>• The speed indicators for EX4400-24T, EX4400-24P, EX4400-24MP, EX4400-48T, EX4400-48P, and EX4400-48MP models are:<ul style="list-style-type: none"><li>• On steadily—1000 Mbps</li><li>• Blinking—100 Mbps</li><li>• Unlit—10 Mbps</li></ul></li><li>• The speed indicators for the SFP ports on the EX4400-48F model are:<ul style="list-style-type: none"><li>• On steadily—1000 Mbps</li><li>• Blinking—100 Mbps</li></ul></li><li>• The speed indicators for the SFP+ ports on EX4400-24X and EX4400-48F models are:<ul style="list-style-type: none"><li>• On steadily—10 Gbps</li><li>• Blinking—1000 Mbps</li></ul></li></ul>

Table 44: Status LEDs on the RJ-45, SFP, and SFP+ Network Ports *(Continued)*

LED	Color	State and Description
	Amber	<p>The speed indicators for EX4400-24MP and EX4400-48MP are:</p> <ul style="list-style-type: none"> <li>On steadily—2.5 Gbps</li> <li>Blinking—5 Gbps</li> </ul>
	Blue	<p>The speed indicator for EX4400-24MP and EX4400-48MP is:</p> <ul style="list-style-type: none"> <li>On steadily—10 Gbps</li> </ul>
DX	Green	<p>Indicates the duplex mode. The status indicators are:</p> <ul style="list-style-type: none"> <li>On steadily—The port is set to full-duplex mode.</li> <li>Unlit—The port is set to half-duplex mode.</li> </ul>
EN	Green	<p>Indicates the administrative status. The status indicators are:</p> <ul style="list-style-type: none"> <li>On steadily—The port is administratively enabled.</li> <li>Unlit—The port is administratively disabled.</li> </ul>
POE	Green	<p>Indicates the PoE-bt mode for ports that support PoE-bt. The status indicators are:</p> <ul style="list-style-type: none"> <li>On steadily—PoE-bt is enabled on the port, and a device is drawing power.</li> <li>Blinking—PoE-bt is enabled on the port, but no power is drawn from the port.</li> <li>Unlit—PoE-bt is not enabled on the port.</li> </ul>

Table 45 on page 82 describes the beacon functionality on the status LEDs on the RJ-45, SFP, and SFP + network ports when you execute the `request chassis beacon` command.

Table 45: Beacon Functionality on the Status LEDs on the RJ-45, SFP, and SFP+ Network Ports

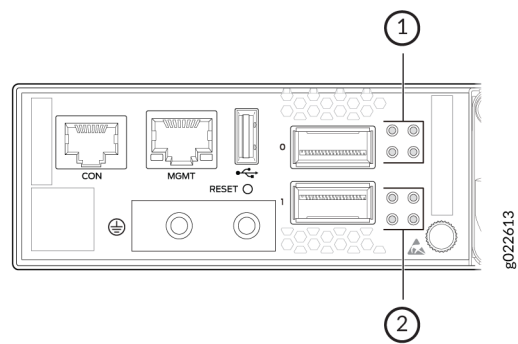
LED	Color	State	Description
Status LEDs on all the ports	Green	Blinking, irrespective of the mode the ports are operating in.	Helps identify the switch.
Status LED on the applicable port			Helps identify the port.

LEDs on the QSFP28 Ports

Figure 55 on page 82 and Figure 56 on page 83 show the LEDs for the QSFP28 ports on EX4400 switch models except the EX4400-24X model. The top left LEDs are lit green when the ports operate as Virtual Chassis ports (VCPs).

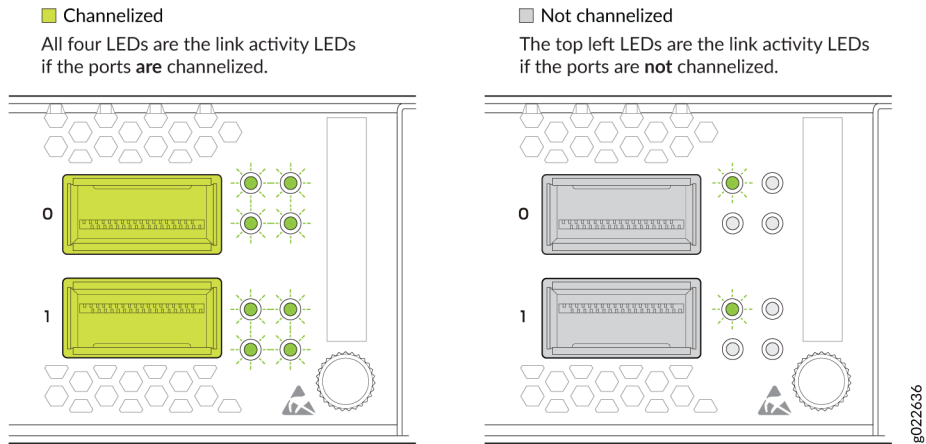
Figure 57 on page 83 and Figure 58 on page 84 show the LEDs for the QSFP28 ports on the EX4400-24X model. The LEDs on the extreme left hand side are lit green when the ports operate as VCPs. Table 46 on page 84 describes the LED when the ports are configured as network ports.

Figure 55: LEDs for the QSFP28 Ports on EX4400 Switch Models Except the EX4400-24X Model



- |                            |                            |
|----------------------------|----------------------------|
| 1– LEDs for the upper port | 2– LEDs for the lower port |
|----------------------------|----------------------------|

**Figure 56: Link Activity LEDs for the QSFP28 Ports on EX4400 Switch Models Except the EX4400-24X Model**



**Figure 57: LEDs for the QSFP28 Ports on the EX4400-24X Model**

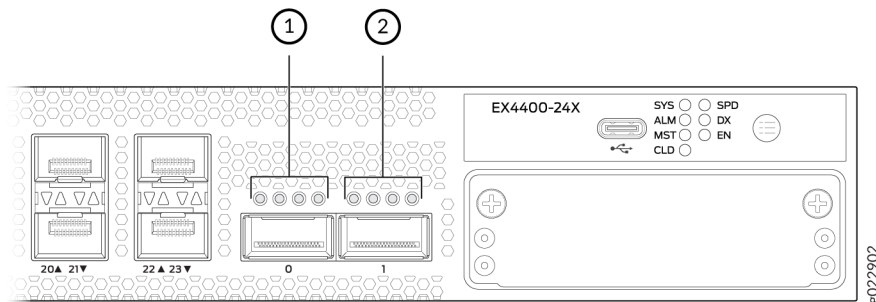




Figure 58: Link Activity LEDs for the QSFP28 Ports on the EX4400-24X Model

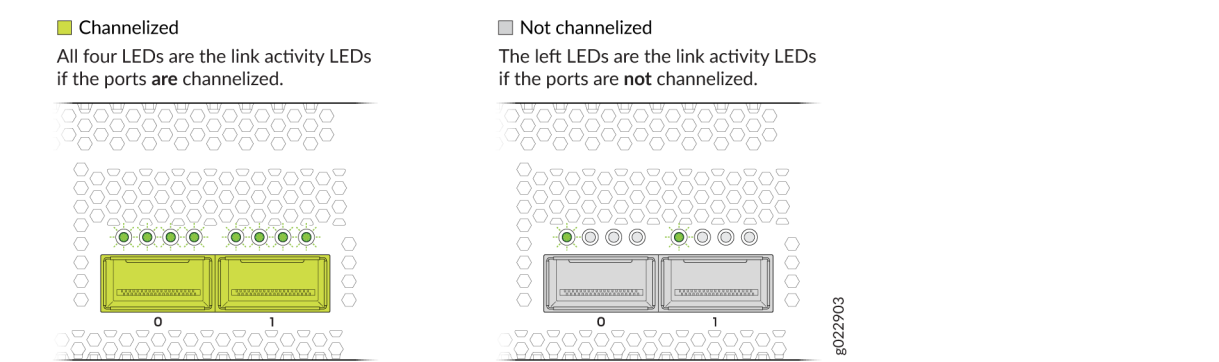


Table 46: Link Activity LED on the QSFP28 Ports

LED	Color	State and Description
Link activity (non-channelized ports)	Green	<ul style="list-style-type: none"><li>On steadily—A 100-Gbps link is established, but there is no link activity.</li><li>Blinking—A 100-Gbps link is established, and there is link activity.</li><li>Off—There is no link.</li></ul>
	Amber <b>NOTE:</b> The support for 40-Gbps nonchannelized speed is available from Junos OS Release 22.1R1.	<ul style="list-style-type: none"><li>On steadily—A 40-Gbps link is established, but there is no link activity.</li><li>Blinking—A 40-Gbps link is established, and there is link activity.</li><li>Off—There is no link.</li></ul>
All four LEDs (channelized ports). The LEDs correspond to the four channels.	Green	<ul style="list-style-type: none"><li>On steadily—A 4x25-Gbps channelized link is established, but there is no link activity.</li><li>Blinking—A 4x25-Gbps channelized link is established, and there is link activity.</li><li>Off—There is no link.</li></ul>

Table 46: Link Activity LED on the QSFP28 Ports *(Continued)*

LED	Color	State and Description
	Amber	<ul style="list-style-type: none"><li>On steadily—A 4x10-Gbps channelized link is established, but there is no link activity.</li><li>Blinking—A 4x10-Gbps channelized link is established, and there is link activity.</li><li>Off—There is no link.</li></ul>

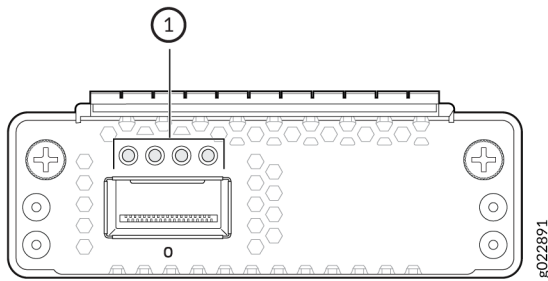
LEDs on the Extension Module Ports

Figure 59 on page 85 shows the LEDs on the 1x100GbE QSFP28 extension module port. Table 48 on page 86 describes the LEDs on that port.

Figure 60 on page 86 shows the LEDs on the 4x10GbE SFP+ extension module ports. Table 47 on page 86 describes the link activity LED on those ports and Table 49 on page 87 describes the status LED on those ports.

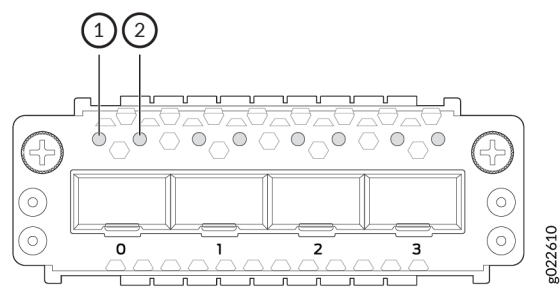
Figure 61 on page 88 shows the LEDs on the 4x25GbE SFP28 extension module ports. Table 47 on page 86 describes the link activity LED on those ports and Table 50 on page 88 describes the status LED on those ports.

Figure 59: LEDs on the 1x100GbE QSFP28 Extension Module Port



1– LEDs	
---------	--

Figure 60: LEDs on the 4x10GbE SFP+ Extension Module Ports



1– Link activity LED	2– Status LED
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Table 47: Link Activity LED on the Extension Module Ports

Color	State and Description
Green	<ul style="list-style-type: none"> <li>On steadily—The port and the link are active, but there is no link activity.</li> <li>Blinking—The port and the link are active, and there is link activity.</li> <li>Unlit—The port is not active.</li> </ul>

Table 48: LEDs on the 1x100GbE QSFP28 Extension Module Port

LED	Color	State and Description
The LED on the extreme left	Green	<ul style="list-style-type: none"> <li>On steadily—A 100-Gbps link is established, but there is no link activity.</li> <li>Blinking—A 100-Gbps link is established, and there is link activity.</li> <li>Off—There is no link.</li> </ul>

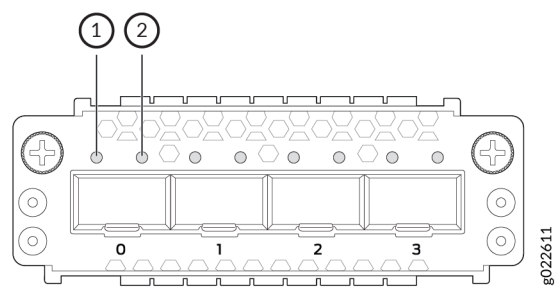
Table 48: LEDs on the 1x100GbE QSFP28 Extension Module Port *(Continued)*

LED	Color	State and Description
	Amber	<ul style="list-style-type: none"> <li>On steadily—A 40-Gbps link is established, but there is no link activity.</li> <li>Blinking—A 40-Gbps link is established, and there is link activity.</li> <li>Off—There is no link.</li> </ul>
All four LEDs (channelized ports). The LEDs correspond to the four channels.	Green	<ul style="list-style-type: none"> <li>On steadily—A 4x25-Gbps channelized link is established, but there is no link activity.</li> <li>Blinking—A 4x25-Gbps channelized link is established, and there is link activity.</li> <li>Off—There is no link.</li> </ul>
	Amber	<ul style="list-style-type: none"> <li>On steadily—A 4x10-Gbps channelized link is established, but there is no link activity.</li> <li>Blinking—A 4x10-Gbps channelized link is established, and there is link activity.</li> <li>Off—There is no link.</li> </ul>

Table 49: Status LED on the 4x10GbE SFP+ Extension Module Ports

Color	State and Description
Green	<p>Indicates the speed. The speed indicators are:</p> <ul style="list-style-type: none"> <li>On steadily—10 Gbps</li> <li>One blink per second—1000 Mbps</li> <li>Unlit—The port is not active.</li> </ul>

Figure 61: LEDs on the 4x25GbE SFP28 Extension Module Ports



1– Link activity LED	2– Status LED
----------------------	---------------

Table 50: Status LED on the 4x25GbE SFP28 Extension Module Ports

Color	State and Description
Green	Indicates the speed. The speed indicators are: <ul style="list-style-type: none"><li>On steadily—10 Gbps</li><li>Three blinks per second—25 Gbps</li><li>Unlit—The port is not active.</li></ul>

# Cooling System and Airflow in an EX4400 Switch

IN THIS SECTION

- Fan Modules | 89
- EX4400 Switches with Front-to-Back Airflow | 90
- EX4400 Switches with Back-to-Front Airflow | 96
- How to Position the Switch | 99
- Fan Module Status | 99
- Heat Dissipation Values | 100

The cooling system in an EX4400 switch consists of two fan modules for the chassis and a single built-in fan in each power supply. The airflow direction depends on the fan modules and power supplies installed in the switch. You can order an EX4400 switch that supports front-to-back (air enters through the front panel of the switch) or back-to-front airflow (air enters through the rear panel of the switch).

## Fan Modules

The fan modules are hot-removable and hot-insertable field-replaceable units (FRUs) installed in the rear panel of the switch. You can remove and replace them without powering off the switch or disrupting switch functions.

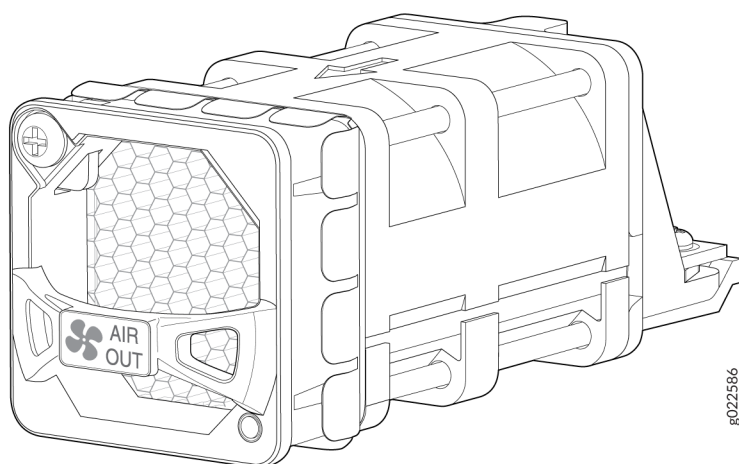
We ship EX4400 switches with two fan modules (1+1 redundancy) preinstalled in the rear panel of the switch. The fan module slots are numbered **0** and **1**, and each slot has a fan icon next to it.

The fan modules are available in two models that have different airflow directions:

- Front-to-back (cold air enters through the vents on the front panel of the switch and hot air exhausts through the vents on the rear panel), indicated by the **AIR OUT** label and the Juniper Gold handle.
- Back-to-front (cold air enters through the vents on the rear panel of the switch and hot air exhausts through the vents on the front panel), indicated by the **AIR IN** label and the Juniper Azure Blue handle.

Figure 62 on page 89 shows the fan module used in an EX4400 switch.

**Figure 62: Fan Module Used in an EX4400 Switch**





**NOTE:** You must install all the fan modules and they must be operational for optimal functioning of the switch.

Leave at least 4 in. (10.16 cm) clearance in front and 2 in. (5.08 cm) behind the chassis for airflow.

If the switch is operational while you are replacing fan modules, you must remove only one fan module at a time. The switch continues to operate for 60 seconds without thermal shutdown while you are replacing a fan module.



**CAUTION:** Do not mix:

- Fan modules with different airflow directions in the same chassis.
- Power supplies with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

If you install power supplies or fan modules with different airflow directions, Junos OS raises an alarm.

Under normal operating conditions, the fan modules operate at a moderate speed. Temperature sensors in the chassis monitor the temperature within the chassis.

If a fan module fails or if the ambient temperature inside the chassis rises above the acceptable range, Junos OS raises an alarm. If the temperature inside the chassis rises above the threshold temperature, the system shuts down automatically.

## EX4400 Switches with Front-to-Back Airflow

In the EX4400 switch models that have front-to-back airflow, cold air enters the chassis through the vents on the front panel and hot air exhausts the chassis through the vents on the rear panel.

- [Figure 63 on page 91](#) shows the front-to-back airflow through an EX4400-24T switch.
- [Figure 64 on page 92](#) shows the front-to-back airflow through an EX4400-24P switch.
- [Figure 65 on page 92](#) shows the front-to-back airflow through an EX4400-24MP switch.
- [Figure 66 on page 93](#) shows the front-to-back airflow through an EX4400-24X switch.
- [Figure 67 on page 93](#) shows the front-to-back airflow through an EX4400-48T switch.

- [Figure 68 on page 94](#) shows the front-to-back airflow through an EX4400-48P switch.
- [Figure 69 on page 94](#) shows the front-to-back airflow through an EX4400-48XP switch.
- [Figure 70 on page 95](#) shows the front-to-back airflow through an EX4400-48MP switch.
- [Figure 72 on page 96](#) shows the front-to-back airflow through an EX4400-48F switch.
- [Figure 71 on page 95](#) shows the front-to-back airflow through an EX4400-48MXP switch.

**Figure 63: Front-to-Back Airflow Through an EX4400-24T Switch Chassis**

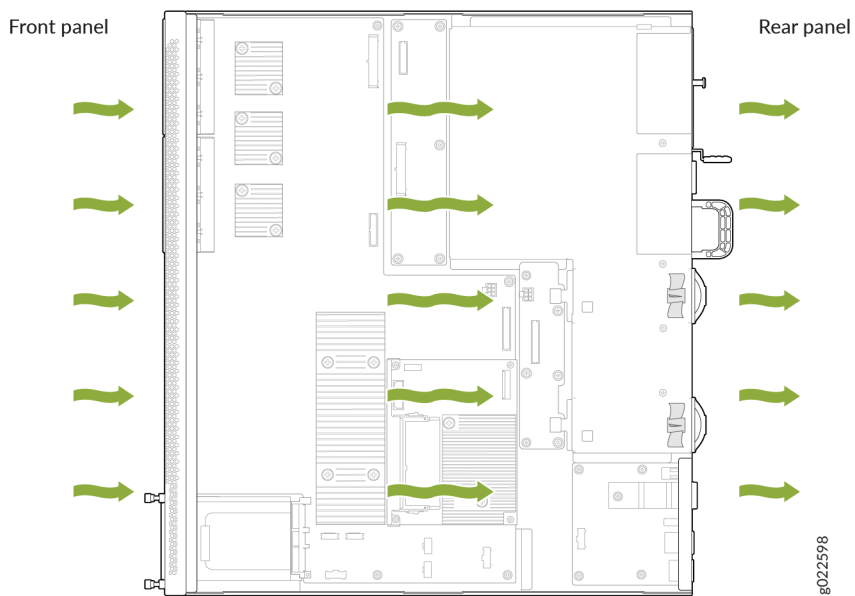




Figure 64: Front-to-Back Airflow Through an EX4400-24P Switch Chassis

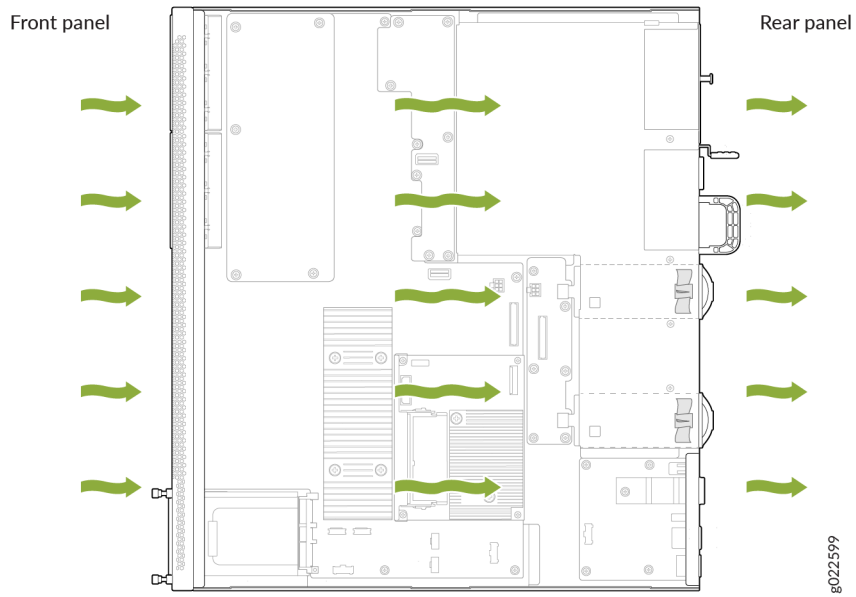


Figure 65: Front-to-Back Airflow Through an EX4400-24MP Switch Chassis



Figure 66: Front-to-Back Airflow Through an EX4400-24X Switch Chassis

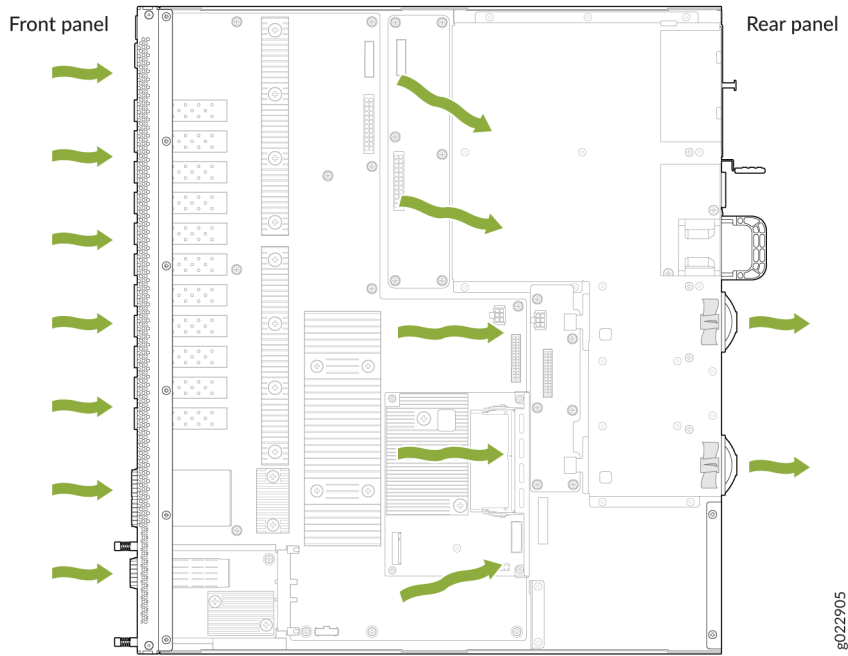


Figure 67: Front-to-Back Airflow Through an EX4400-48T Switch Chassis

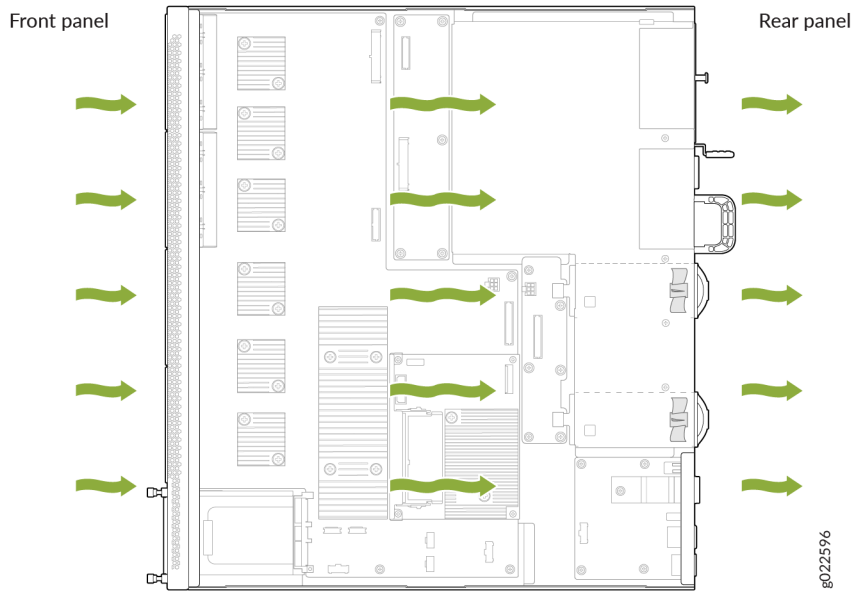


Figure 68: Front-to-Back Airflow Through an EX4400-48P Switch Chassis

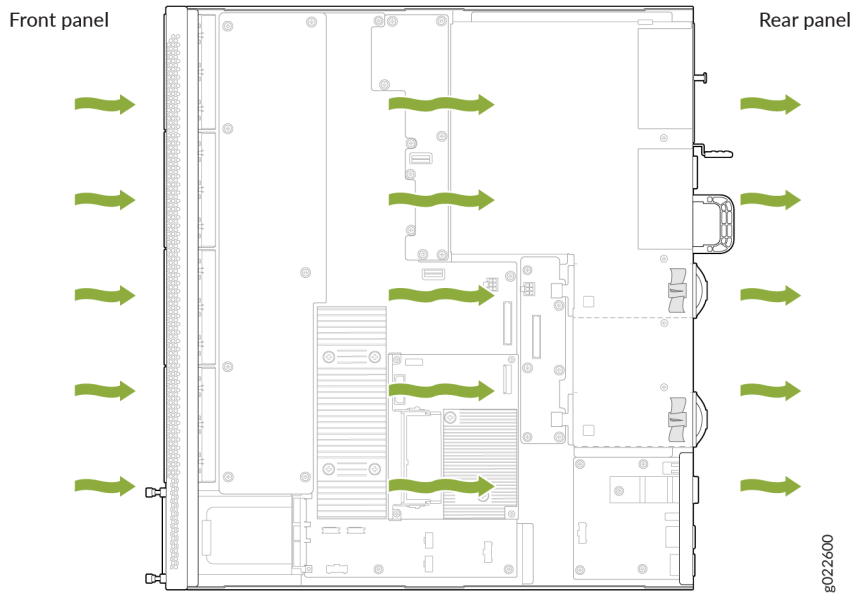


Figure 69: Front-to-Back Airflow Through an EX4400-48XP Switch Chassis

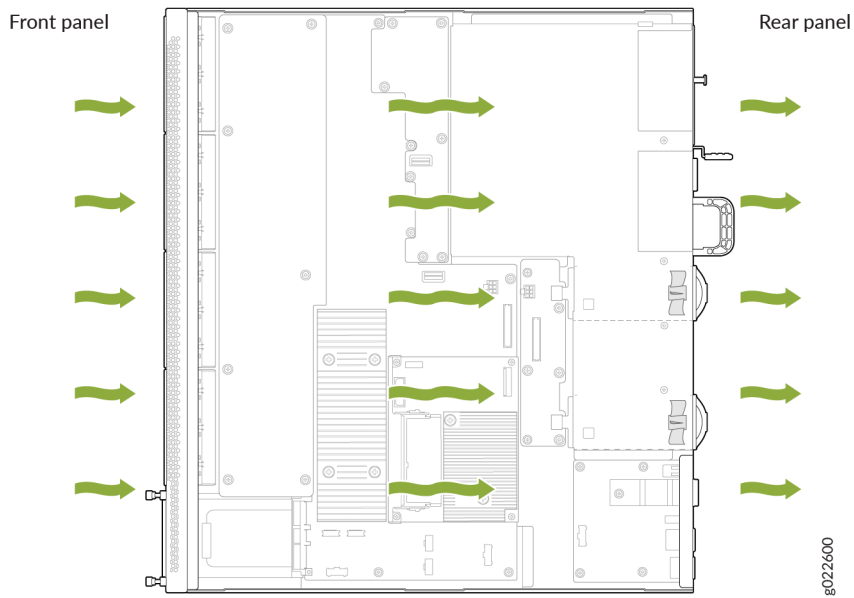


Figure 70: Front-to-Back Airflow Through an EX4400-48MP Switch Chassis

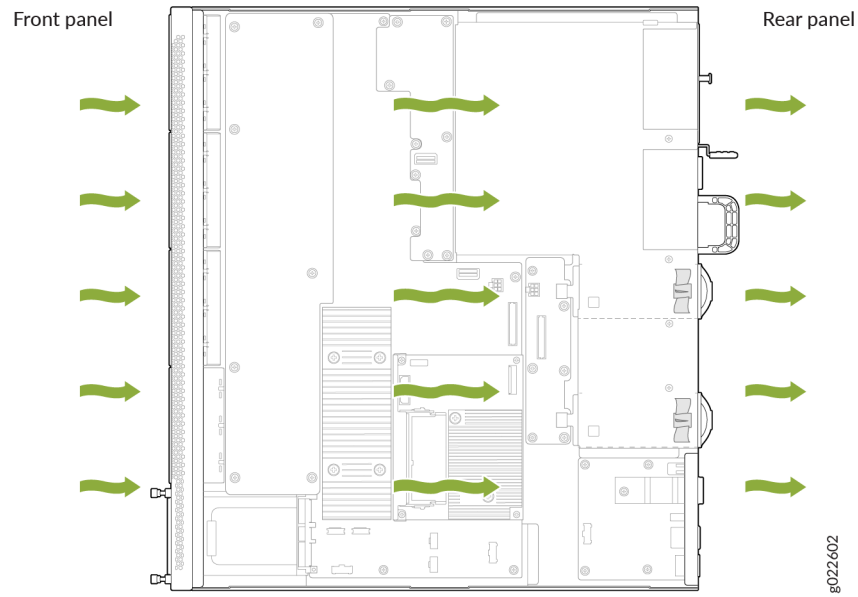
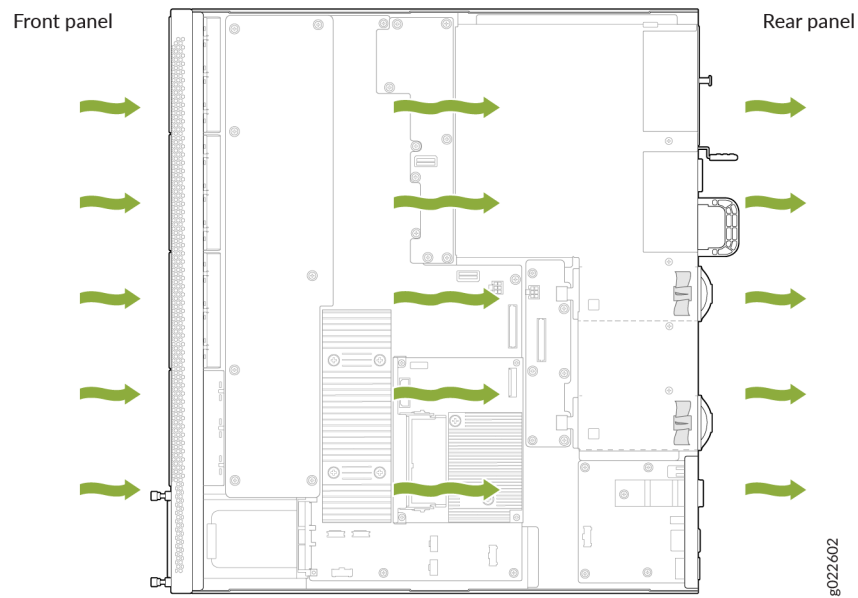


Figure 71: Front-to-Back Airflow Through an EX4400-48MXP Switch Chassis



**Figure 72: Front-to-Back Airflow Through an EX4400-48F Switch Chassis**



Mixing components with different airflow directions in the same chassis hampers the performance of the cooling system of the switch and leads to overheating of the chassis.

## EX4400 Switches with Back-to-Front Airflow

In the EX4400 switch models that have back-to-front airflow, cold air enters the chassis through the vents on the rear panel of the switch and hot air exhausts the chassis through the vents on the front panel.

- [Figure 73 on page 97](#) shows the back-to-front airflow through an EX4400-24T switch.
- [Figure 74 on page 97](#) shows the back-to-front airflow through an EX4400-24X switch.
- [Figure 75 on page 98](#) shows the back-to-front airflow through an EX4400-48T switch.
- [Figure 76 on page 98](#) shows the back-to-front airflow through an EX4400-48F switch.

Figure 73: Back-to-Front Airflow Through an EX4400-24T Switch Chassis

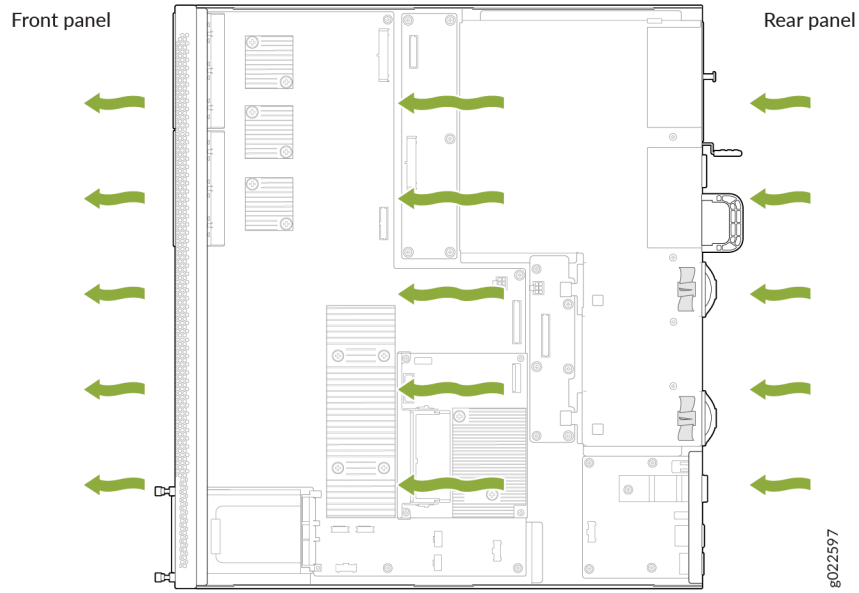


Figure 74: Back-to-Front Airflow Through an EX4400-24X Switch Chassis



Figure 75: Back-to-Front Airflow Through an EX4400-48T Switch Chassis

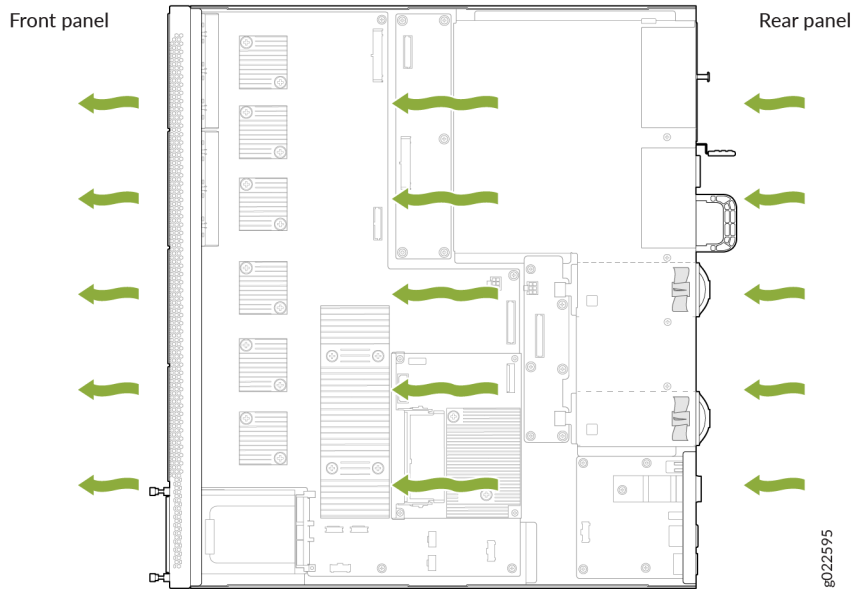
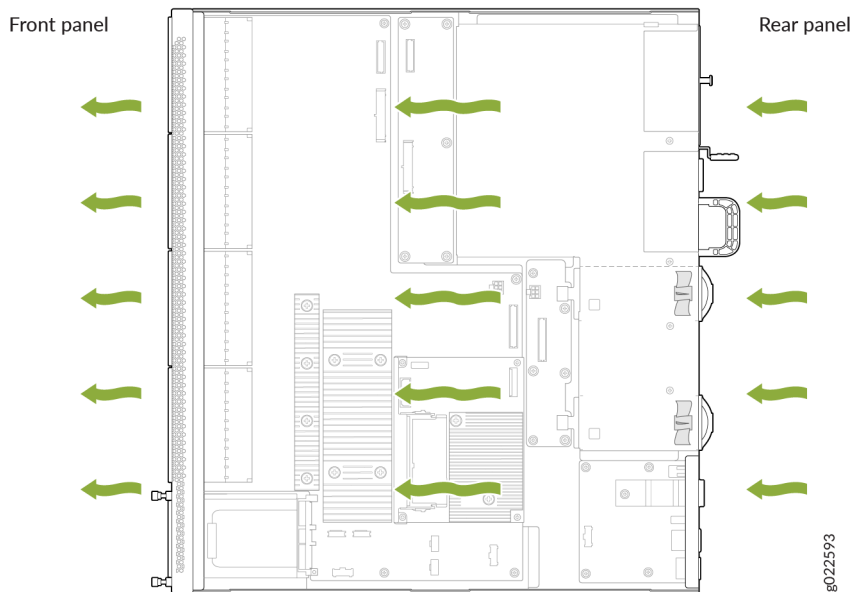


Figure 76: Back-to-Front Airflow Through an EX4400-48F Switch Chassis

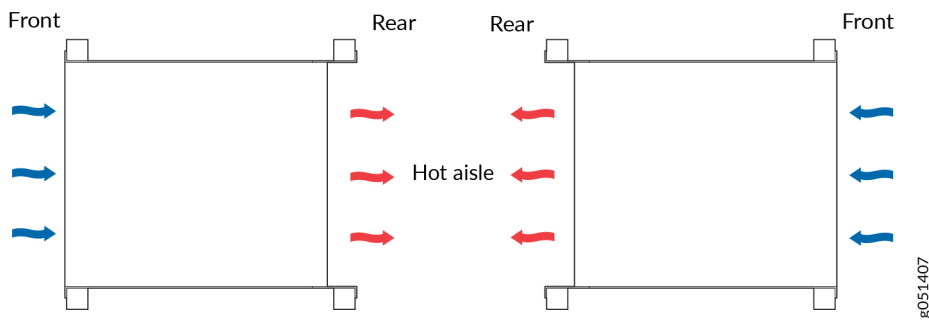


Mixing components with different airflow directions in the same chassis hampers the performance of the cooling system of the switch and leads to overheating of the chassis.

## How to Position the Switch

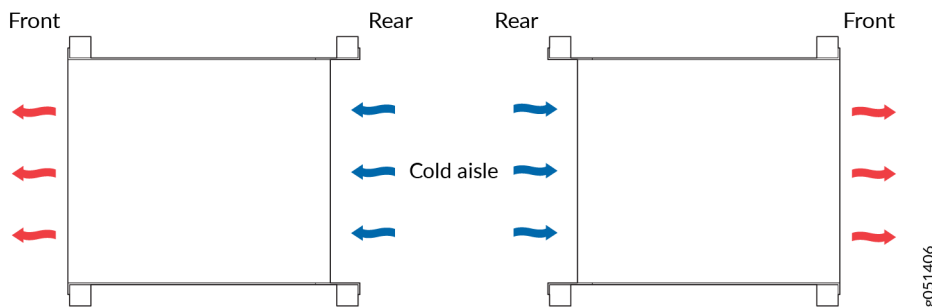
Position the switch with front-to-back airflow in such a manner that the **AIR OUT** labels on the fan modules and power supplies are next to the hot aisle (see [Figure 77 on page 99](#)).

**Figure 77: Deployment of Switches with Front-to-Back Airflow Through the Switch Chassis**



Position the switch with back-to-front airflow in such a manner that the **AIR IN** labels on the fan modules and power supplies are next to the cold aisle (see [Figure 78 on page 99](#)).

**Figure 78: Deployment of Switches with Back-to-Front Airflow Through the Switch Chassis**



## Fan Module Status

Each fan module has a status LED on it that indicates the status of the fan module (see [Figure 79 on page 100](#)).



**Figure 79: Fan Module LED**

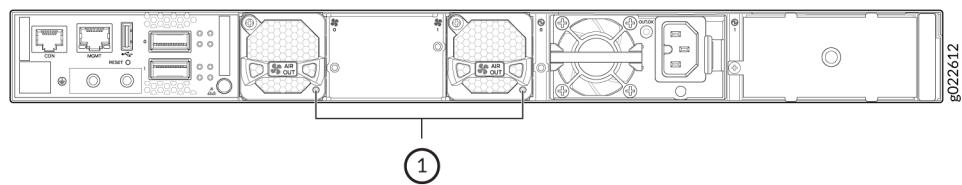


Table 51 on page 100 describes the LED.

**Table 51: Fan Module Status LED**

State	Description
Lit green	The fan module is functioning normally.
Unlit	Indicates one of the following: <ul style="list-style-type: none"> <li>The fan module is not installed properly.</li> <li>The fan module is not functioning normally.</li> <li>The airflow direction of the fan module does not match with the airflow direction of the other components installed in the switch.</li> </ul>

## Heat Dissipation Values

The following table enumerates the heat dissipation values for the EX4400 switches.

**Table 52: EX4400 heat dissipation at incremental load levels**

Switch Model	PSU Type	PSU (W)	Dissipation Values (BTU/hr)				
			Idle 0% Traffic	10% Traffic	30% Traffic	50% Traffic	100% Max
EX4400-24 MP	AC	1050	467.17	467.17	470.58	473.99	477.4

Table 52: EX4400 heat dissipation at incremental load levels *(Continued)*

Switch Model	PSU Type	PSU (W)	Dissipation Values (BTU/hr)				
			Idle 0% Traffic	10% Traffic	30% Traffic	50% Traffic	100% Max
EX4400-24 MP with PoE	AC	1050	6,339.19	6,339.19	6,342.6	6,342.6	6,346.01
EX4400-24 MP-S	DC	2000	306.9	375.1	388.74	405.7	419.4
EX4400-24 MP-S with PoE	DC	2000	7672.5	7,740.7	7,754.34	7,771.39	7,785.03
EX4400-24 P	AC	1050	296.67	385.33	402.38	416.02	433.07
EX4400-24 P with PoE	AC	1050	5,445.77	5,445.77	5,452.59	5,452.59	5,459.41
EX4400-24 P-S	DC	2000	296.67	385.33	402.38	416.02	433.07
EX4400-24 P-S with PoE	DC	2000	7,662.27	7,750.93	7,767.98	7,781.62	7,798.67
EX4400-24 T	AC	550	300.08	296.67	306.9	310.31	313.72
EX4400-24 T	DC	550	320.54	323.95	327.36	330.77	337.59

Table 52: EX4400 heat dissipation at incremental load levels *(Continued)*

Switch Model	PSU Type	PSU (W)	Dissipation Values (BTU/hr)				
			Idle 0% Traffic	10% Traffic	30% Traffic	50% Traffic	100% Max
EX4400-24 X	AC	550	422.84	433.07	443.3	453.53	470.58
EX4400-24 X	DC	550	463.76	467.17	473.99	480.81	497.86
EX4400-48 MP	AC	1600	620.62	620.62	624.03	624.03	630.85
EX4400-48 MP with PoE	AC	1600	8,470.44	8,470.44	8,470.44	8,473.85	8,477.26
EX4400-48 MP-S	DC	2000	364.87	579.7	600.16	613.8	630.85
EX4400-48 MP-S with PoE	DC	2000	7,866.87	8,081.7	8,102.16	8,115.8	8,132.85
EX4400-48 P	AC	1600	456.94	456.94	460.35	463.76	470.58
EX4400-48 P with PoE	AC	1600	6,693.83	6,693.83	6,697.24	6,704.06	6,707.47
EX4400-48 P-S	DC	2000	412.61	477.4	501.27	514.91	531.96

Table 52: EX4400 heat dissipation at incremental load levels *(Continued)*

Switch Model	PSU Type	PSU (W)	Dissipation Values (BTU/hr)				
			Idle 0% Traffic	10% Traffic	30% Traffic	50% Traffic	100% Max
EX4400-48 P-S with PoE	DC	2000	7,914.61	7,979.4	8,003.27	801.35	8,033.96
EX4400-48 T	DC	550	344.41	344.41	347.82	351.23	361.46
EX4400-48 T	AC	550	323.95	323.95	327.36	330.77	337.59
EX4400-48 F	AC	550	388.74	392.15	395.56	402.38	412.61
EX4400-48 F	DC	550	429.66	433.07	436.48	443.3	453.53
EX4400-48 XP	AC	2000	318.835	535.029	555.148	565.037	575.267
EX4400-48 XP with PoE	AC	2000	12,937.54	12,951.18	12,964.82	12,978.46	12,998.92
EX4400-48 XP-S	DC	2000	405.79	409.2	419.43	439.89	450.12
EX4400-48 XP-S with PoE	DC	2000	12,681.79	12,685.2	12,695.43	12,715.89	12,726.12

Table 52: EX4400 heat dissipation at incremental load levels *(Continued)*

Switch Model	PSU Type	PSU (W)	Dissipation Values (BTU/hr)				
			Idle 0% Traffic	10% Traffic	30% Traffic	50% Traffic	100% Max
EX4400-48 MXP	AC	2000	357.368	358.05	367.257	387.717	398.288
EX4400-48 MXP with PoE	AC	2000	12,753.4	12,794.32	12,814.78	12,835.24	12,876.16
EX4400-48 MXP-S	DC	2000	388.74	603.57	624.03	634.26	647.9
EX4400-48 MXP-S with PoE	DC	2000	12,664.74	12,879.57	12,900.03	12,910.26	12,920.49

## EX4400 Power System

### IN THIS SECTION

- [AC Power Supply in EX4400 Switches | 105](#)
- [DC Power Supply in EX4400 Switches | 123](#)
- [Power Supply LEDs in EX4400 Switches | 134](#)

## AC Power Supply in EX4400 Switches

### IN THIS SECTION

- [Characteristics of the AC Power Supply | 105](#)
- [Specifications of the AC Power Supplies Used in EX4400 Switches | 108](#)
- [AC Power Supply Airflow | 111](#)
- [Specifications of the Power Cord for AC Power Supplies for EX4400 Switches | 112](#)
- [PoE-bt Budget Planning | 117](#)

We ship the EX4400 switches with one power supply preinstalled in the rear panel of the switches. You can install up to two power supplies in the switch. You must order the second power supply and a power source cord separately. The power supply slots are numbered **0** and **1**, and each slot has a power icon next to it. The power supplies support front-to-back or back-to-front airflow directions. The power supplies are fully redundant, load-sharing, and hot-removable and hot-insertable field-replaceable units (FRUs) when the second power supply is installed and running. You can remove and replace either one of the power supplies without powering off the switch or disrupting switch functions.

Do not mix:

- AC and DC power supplies in the same chassis.
- Power supplies with different airflow directions in the same chassis.
- Fan modules with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

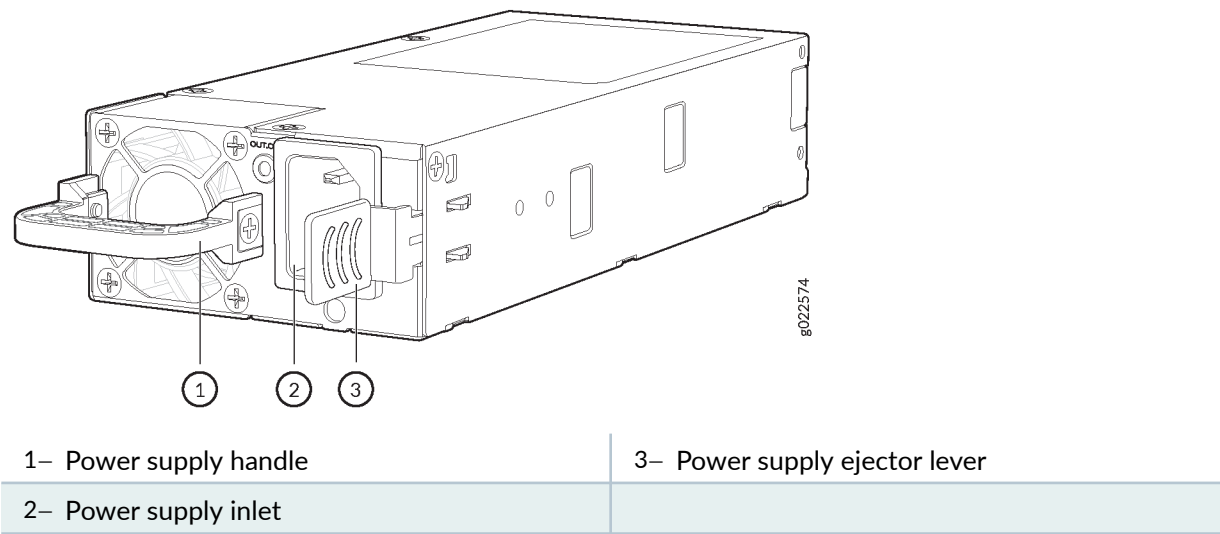
This topic describes the AC power supplies that EX4400 switches support.

### Characteristics of the AC Power Supply

The AC power supplies for EX4400 switches come in 550-W, 1050-W, 1600-W, and 2000-W models. EX4400-24T, EX4400-24X, EX4400-48T, and EX4400-48F switches support 550-W AC power supplies (see [Figure 80 on page 106](#)). EX4400-24P and EX4400-24MP switches support 1050W and 1600-W AC power supplies. These models support 1600-W AC power supply if you have Junos OS Release 22.3R1 or later installed. We ship the models with one 1050-W power supply. You can order the 1600-W power supply separately. EX4400-48P and EX4400-48MP switches support 1600-W AC power supplies. EX4400-48XP and EX4400-48MXP support 2000-W AC power supplies. You must not install different models of power supplies in the same chassis. The AC power supplies support IEEE 802.3bt

Power over Ethernet (PoE-bt) in EX4400-24P, EX4400-24MP, EX4400-48P, EX4400-48XP, EX4400-48MXP, and EX4400-48MP models.

**Figure 80: 550-W AC Power Supply for EX4400-24T, EX4400-24X, EX4400-48T, and EX4400-48F Switches**



**Figure 81: 1050-W AC Power Supply**

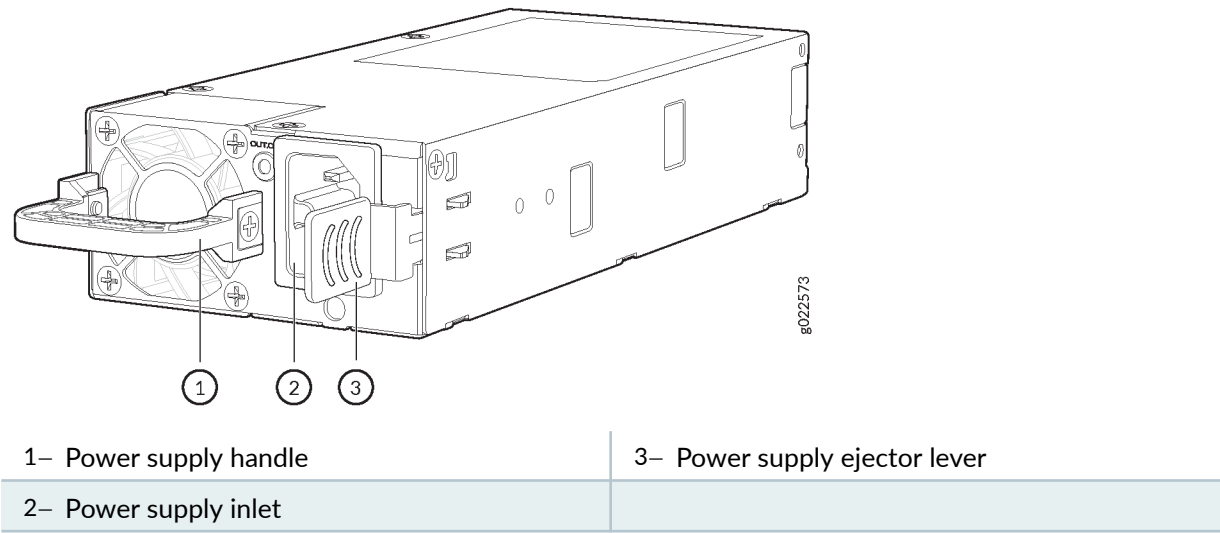


Figure 82: 1600-W AC Power Supply

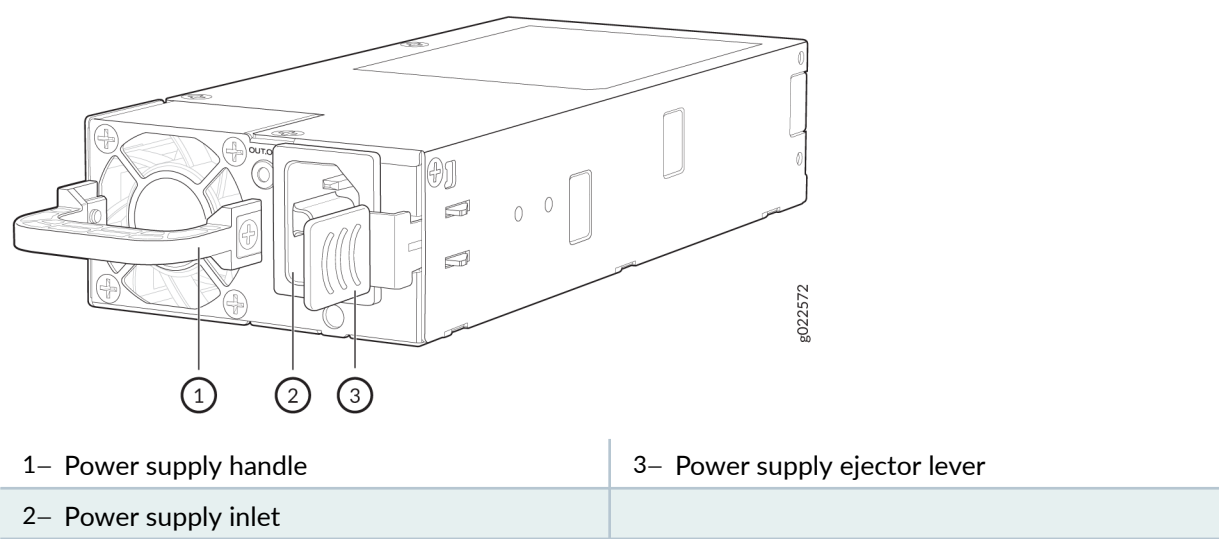


Figure 83: 2000-W AC Power Supply

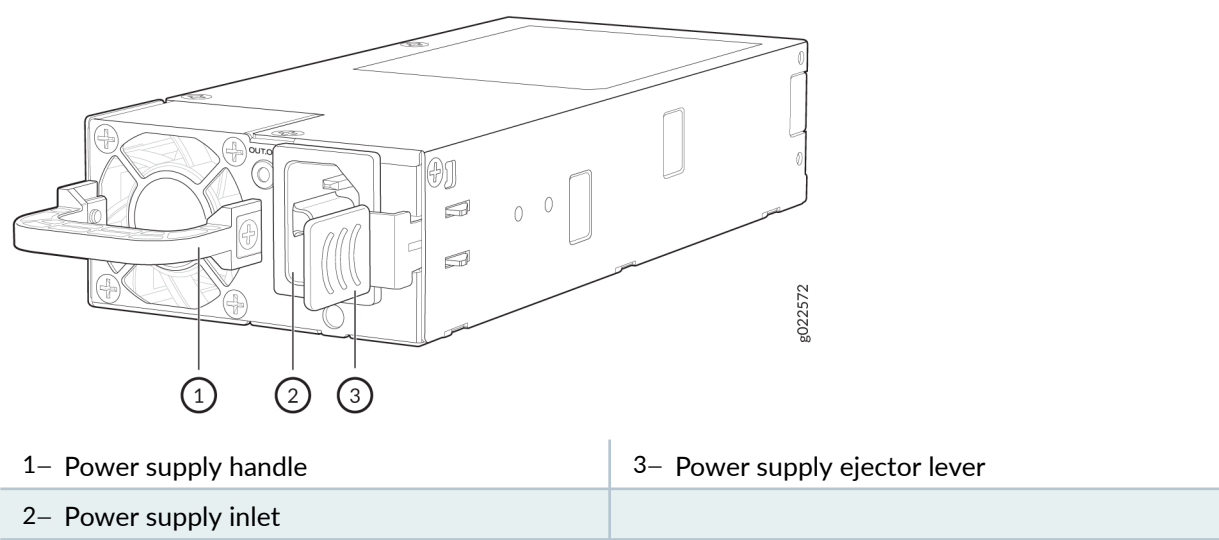


Table 53 on page 108 lists the details of the 550-W, 1050-W, 1600-W, and 2000-W AC power supplies used in EX4400 switches.



**Table 53: Details of the AC Power Supplies in EX4400 Switches**

Details		550-W AC Power Supply	1050-W AC Power Supply	1600-W AC Power Supply	2000-W AC Power Supply
Model number		<ul style="list-style-type: none"> <li>JPSU-550-C-AC-AFO</li> <li>JPSU-550-C-AC-AFI</li> </ul>	JPSU-1050-C-AC-AFO	JPSU-1600-C-AC-AFO	JPSU-2000-C-AC-AFO
Minimum installed in chassis		1	1	1	1
Maximum installed in chassis		2	2	2	2
AC appliance inlet	Num ber	1	1	1	1
	Type	IEC-320-C13	IEC-320-C15	IEC-320-C15	IEC-320-C15
<b>NOTE:</b> Each AC appliance inlet requires a dedicated AC power feed.					
Power supply status LED		OUT.OK	OUT.OK	OUT.OK	OUT.OK

To prevent electrical injury while installing or removing AC power supplies, carefully follow instructions in ["Install a Power Supply in an EX4400 Switch" on page 242](#) and ["Remove a Power Supply from an EX4400 Switch" on page 240](#).

### Specifications of the AC Power Supplies Used in EX4400 Switches

- [Table 54 on page 109](#) provides the power supply specifications of the 550-W AC power supplies.
- [Table 55 on page 109](#) provides the power supply specifications of the 1050-W AC power supplies.

- [Table 56 on page 110](#) provides the power supply specifications of the 1600-W AC power supplies.
- [Table 57 on page 110](#) provides the power supply specifications of the 2000-W AC power supplies.

**Table 54: Specifications of the 550-W AC Power Supplies Used in EX4400 Switches**

Item	Specification
AC input voltage	<ul style="list-style-type: none"> <li>• Low-voltage line: 100–127 VAC</li> <li>• High-voltage line: 200–240 VAC</li> </ul>
AC input line frequency	47–63 Hz
AC input current rating	<ul style="list-style-type: none"> <li>• Low-voltage line: 7.1 A</li> <li>• High-voltage line: 3.4 A</li> </ul>
Output power	550 W
Efficiency	80-plus platinum efficiency certified

**Table 55: Specifications of the 1050-W AC Power Supplies Used in EX4400 Switches**

Item	Specification
AC input voltage	<ul style="list-style-type: none"> <li>• Low-voltage line: 100–120 VAC</li> <li>• High-voltage line: 200–240 VAC</li> </ul>
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> <li>• Low-voltage line: 12 A</li> <li>• High-voltage line: 6.05 A</li> </ul>
Output power	1050 W

**Table 55: Specifications of the 1050-W AC Power Supplies Used in EX4400 Switches (Continued)**

Item	Specification
Efficiency	80-plus platinum efficiency certified

**Table 56: Specifications of the 1600-W AC Power Supplies Used in EX4400 Switches**

Item	Specification
AC input voltage	<ul style="list-style-type: none"> <li>• Low-voltage line: 100–120 VAC</li> <li>• High-voltage line: 200–240 VAC</li> </ul>
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> <li>• Low-voltage line: 12 A</li> <li>• High-voltage line: 9 A</li> </ul>
Output power	1600 W
Efficiency	80-plus platinum efficiency certified

**Table 57: Specifications of the 2000-W AC Power Supplies Used in EX4400 Switches**

Item	Specification
AC input voltage	<ul style="list-style-type: none"> <li>• Low-voltage line: 100–120 VAC</li> <li>• High-voltage line: 200–240 VAC</li> </ul>
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> <li>• Low-voltage line: 12 A</li> <li>• High-voltage line: 9 A</li> </ul>

Table 57: Specifications of the 2000-W AC Power Supplies Used in EX4400 Switches (*Continued*)

Item	Specification
Output power	2000 W
Efficiency	80-plus platinum efficiency certified

## AC Power Supply Airflow

Each power supply has its own fan and is cooled by its own internal cooling system. EX4400 switches support power supplies with the following airflow directions:

- Front-to-back (cold air enters through the vents on the front panel of the switch and hot air exhausts through the vents on the rear panel), indicated by the **AIR OUT** label and the orange handle.
- Back-to-front (cold air enters through the vents on the rear panel of the switch and hot air exhausts through the vents on the front panel), indicated by the **AIR IN** label and the Juniper Azure Blue handle.

Table 58 on page 111 lists the AC power supply models and the direction of airflow in them.

Table 58: Airflow Direction in AC Power Supply Models for EX4400 Switches

Model	Direction of Airflow
<ul style="list-style-type: none"> <li>• JPSU-550-C-AC-AFO</li> <li>• JPSU-1050-C-AC-AFO</li> <li>• JPSU-1600-C-AC-AFO</li> <li>• JPSU-2000-C-AC-AFO</li> </ul>	Front-to-back—that is, cold air enters the chassis through the vents on the front panel of the chassis and hot air exhausts through the vents on the rear panel of the chassis, indicated by the <b>AIR OUT</b> label and the orange handle.
JPSU-550-C-AC-AFI	Back-to-front—that is, cold air enters the chassis through the vents on the rear panel of the chassis and hot air exhausts through the vents on the front panel of the chassis, indicated by the <b>AIR IN</b> label and the Juniper Azure Blue handle.

## Specifications of the Power Cord for AC Power Supplies for EX4400 Switches

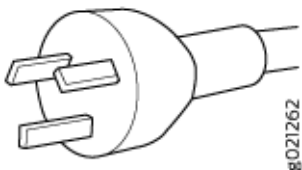
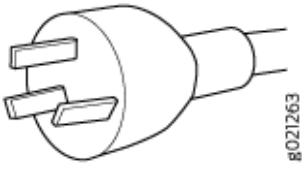
Each AC power supply has a single AC appliance inlet that requires a dedicated AC power feed. A detachable AC power cord is supplied with each AC power supply. We ship the 550-W AC power supplies with AC power cords with the C13 coupler type and the 1050-W, 1600-W AC, and 2000-W AC power supplies with the C15 coupler type as described by International Electrotechnical Commission (IEC) standard 60320. The plug end of the power cord fits into the power source outlet that is standard for your geographical location.



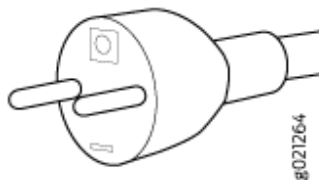
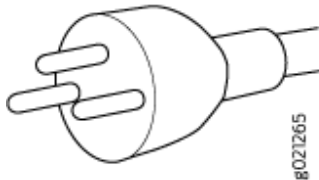
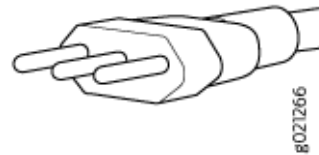
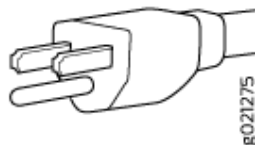
**NOTE:** In North America, AC power cords must not exceed 14.75 ft (4.5 m) in length, to comply with National Electrical Code (NEC) Section 400-8 (NFPA 75, 5-2.2) and Canadian Electrical Code (CEC) Section 4-010(3).

Table 59 on page 112 lists the AC power cords specifications provided for the 550-W power supplies for each country or region.

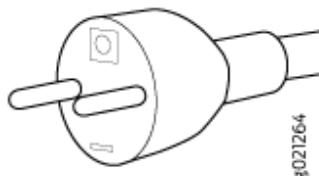
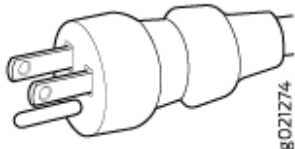
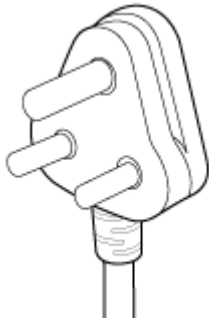

**Table 59: AC Power Cord Specifications for 550-W AC Power Supplies for EX4400-24T, EX4400-24X, EX4400-48T, and EX4400-48F Switches**

Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Argentina	250 VAC, 10 A, 50 Hz	IRAM 2073 Type RA/3	CBL-EX-PWR-C13- AR	No graphic available
Australia	250 VAC, 10 A, 50 Hz	AS/NZS 3112 Type SAA/3	CBL-EX-PWR-C13- AU	
Brazil	250 VAC, 10 A, 50 Hz	NBR 14136 Type BR/3	CBL-EX-PWR-C13- BR	No graphic available
China	250 VAC, 10 A, 50 Hz	GB 1002-1996 Type PRC/3	CBL-EX-PWR-C13- CH	

**Table 59: AC Power Cord Specifications for 550-W AC Power Supplies for EX4400-24T, EX4400-24X, EX4400-48T, and EX4400-48F Switches (Continued)**

Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Europe (except Italy, Switzerland , and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-EX-PWR-C13- EU	 g021264
India	250 VAC, 10 A, 50 Hz	IS 1293 Type IND/3	CBL-EX-PWR-C13-IN	No graphic available
Israel	250 VAC, 10 A, 50 Hz	SI 32/1971 Type IL/3G	CBL-EX-PWR-C13-IL	 g021265
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16 Type I/3G	CBL-EX-PWR-C13-IT	 g021266
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	JIS 8303	CBL-EX-PWR-C13-JP	 g021275

**Table 59: AC Power Cord Specifications for 550-W AC Power Supplies for EX4400-24T, EX4400-24X, EX4400-48T, and EX4400-48F Switches (Continued)**

Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Korea	250 VAC, 10 A, 50 Hz or 60 Hz	CEE (7) VII Type VIIGK	CBL-EX-PWR-C13- KR	 g021264
North America	125 VAC, 13 A, 60 Hz	NEMA 5-15 Type N5-15	CBL-EX-PWR-C13- US	 g021274
South Africa	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-EX-PWR-C13- SA	 g021289
Switzerland	250 VAC, 10 A, 50 Hz	SEV 6534-2 Type 12G	CBL-EX-PWR-C13- SZ	No graphic available
Taiwan	125 VAC, 10 A, 50 Hz	NEMA 5-15P Type N5-15P	CBL-EX-PWR-C13- TW	 g021288

**Table 59: AC Power Cord Specifications for 550-W AC Power Supplies for EX4400-24T, EX4400-24X, EX4400-48T, and EX4400-48F Switches (Continued)**


Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A Type BS89/13	CBL-EX-PWR-C13- UK	 g021271

Table 60 on page 115 lists the specifications of the power cords used to connect EX4400 switches to C13 Power Strips.

**Table 60: Specifications of Power Cords Used to Connect EX4400-24T, EX4400-24X, EX4400-48T, and EX4400-48F Switches to C13 Power Strips**

Country/Region	Electrical Specifications	Juniper Model Number
USA, China, Japan, Europe, South Korea, Australia	250 VAC, 10 A, 50 Hz	CBL-EX-PWR-C13-C14

Table 61 on page 115 lists the AC power cords specifications provided for the 1050-W, 1600-W, and 2000-W power supplies for each country or region.

**Table 61: AC Power Cord Specifications for 1050-W, 1600-W, and 2000-W Power Supplies for EX4400-24P, EX4400-24MP, EX4400-48P, EX4400-48XP, EX4400-48MXP and EX4400-48MP Switches**

Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number
Argentina	250 VAC, 10 A, 50 Hz	IRAM 2073 Type RA/3	CBL-PWR-C15M-HITEMP- AR
Australia	250 VAC, 10 A, 50 Hz	AS/NZS 3112-2000 Type SAA/3	CBL-PWR-C15M-HITEMP- AU



**Table 61: AC Power Cord Specifications for 1050-W, 1600-W, and 2000-W Power Supplies for EX4400-24P, EX4400-24MP, EX4400-48P, EX4400-48XP, EX4400-48MXP and EX4400-48MP Switches (Continued)**

Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number
Brazil	250 VAC, 10 A, 50 Hz	NBR 14136 Type BR/3	CBL-PWR-C15M-HITEMP-BR
China	250 VAC, 10 A, 50 Hz	GB2099, GB1002 Type PRC/3	CBL-PWR-C15M-HITEMP-CH
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-PWR-C15M-HITEMP-EU
Israel	250 VAC, 10 A, 50 Hz	SI 32 Type IL/3G	CBL-PWR-C15M-HITEMP-IL
India	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-PWR-C15M-HITEMP-IN
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16 Type I/3G	CBL-PWR-C15M-HITEMP-IT
Japan	125 VAC, 15 A, 50 Hz or 60 Hz	JIS 8303 Type 498GJ	CBL-PWR-C15M-HITEMP-JP
Korea	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-PWR-C15M-HITEMP-KR
South Africa	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-PWR-C15M-HITEMP-SA
North America	125 VAC, 15 A, 60 Hz	NEMA 5-15 Type N5/15	CBL-PWR-C15M-HITEMP-US

**Table 61: AC Power Cord Specifications for 1050-W, 1600-W, and 2000-W Power Supplies for EX4400-24P, EX4400-24MP, EX4400-48P, EX4400-48XP, EX4400-48MXP and EX4400-48MP Switches (Continued)**

Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number
Switzerland	250 VAC, 10 A, 50 Hz	SEV 1011 / 6534-2 Type 12G	CBL-PWR-C15M-HITEMP-SZ
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A Type BS89/13	CBL-PWR-C15M-HITEMP-UK

Table 62 on page 117 lists the specifications of the power cords used to connect EX4400 switches to C13 Power Strips.

**Table 62: Specifications of Power Cords Used to Connect 1050-W and 1600-W Power Supplies for EX4400-24P, EX4400-24MP, EX4400-48P, and EX4400-48MP Switches to C13 Power Strips**

Country/Region	Electrical Specifications	Juniper Model Number
Europe	250 VAC, 10 A, 50 Hz	CBL-PWR-C15-C14-EU
North America	125 VAC, 15 A, 60 Hz	CBL-PWR-C15-C14-US



**CAUTION:** You must use the AC power cord for the EX4400 switch with this switch only. Do not use the cord with any other product.



**CAUTION:** Power cords must not block access to switch components.

## PoE-bt Budget Planning

Table 63 on page 118 lists the PoE-bt power available in an EX4400-24P switch.

**Table 63: PoE-bt Power Available in an EX4400-24P Switch**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
1050 W	–	110 V	783 W
		230 V	783 W
1050 W	1050 W	110 V	1806 W
		230 V	1806 W
1600 W	–	110 V	783 W
		230 V	1320 W
1600 W	1600 W	110 V	1806 W
		230 V	2160 W

Table 64 on page 118 lists the PoE-bt power available in an EX4400-24P switch if Junos OS Release 22.2R1 or earlier is installed in the switch.

**Table 64: PoE-bt Power Available in an EX4400-24P Switch if Junos OS Release 22.2R1 or Earlier is Installed in the Switch**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
1050 W	–	110 V	788 W
		230 V	788 W

**Table 64: PoE-bt Power Available in an EX4400-24P Switch if Junos OS Release 22.2R1 or Earlier is Installed in the Switch (Continued)**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
1050 W	1050 W	110 V	1440 W
		230 V	1440 W

Table 65 on page 119 lists the PoE-bt power available in an EX4400-24MP switch.

**Table 65: PoE-bt Power Available in an EX4400-24MP Switch**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
1050 W	–	110 V	753 W
		230 V	753 W
1050 W	1050 W	110 V	1776 W
		230 V	1776 W
1600 W	–	110 V	753 W
		230 V	1290 W
1600 W	1600 W	110 V	1776 W
		230 V	2160 W

Table 66 on page 120 lists the PoE-bt power available in an EX4400-24MP switch if Junos OS Release 22.2R1 or earlier is installed in the switch.

**Table 66: PoE-bt Power Available in an EX4400-24MP Switch if Junos OS Release 22.2R1 or Earlier is Installed in the Switch**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
1050 W	–	110 V	780 W
		230 V	780 W
1050 W	1050 W	110 V	1800 W
		230 V	1800 W

Table 67 on page 120 lists the PoE-bt power available in an EX4400-48P switch.

**Table 67: PoE-bt Power Available in an EX4400-48P Switch**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
1600 W	–	110 V	773 W
		230 V	1310 W
1600 W	1600 W	110 V	1796 W
		230 V	2200 W

Table 68 on page 121 lists the PoE-bt power available in an EX4400-48P switch if Junos OS Release 22.2R1 or earlier is installed in the switch.

**Table 68: PoE-bt Power Available in an EX4400-48P Switch if Junos OS Release 22.2R1 or Earlier is Installed in the Switch**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
1600 W	–	110 V	768 W
		230 V	1290 W
1600 W	1600 W	110 V	1440 W
		230 V	1800 W

[Table 69 on page 121](#) lists the PoE-bt power available in an EX4400-48XP switch.

**Table 69: PoE-bt Power Available in an EX4400-48XP Switch**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
2000 W	–	110 V	724 W
		230 V	1650 W
2000 W	2000 W	110 V	1748 W
		230 V	3600 W

[Table 70 on page 122](#) lists the PoE-bt power available in an EX4400-48MXP switch.

**Table 70: PoE-bt Power Available in an EX4400-48MXP Switch**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
2000 W	–	110 V	724 W
		230 V	1650 W
2000 W	2000 W	110 V	1748 W
		230 V	3600 W

[Table 71 on page 122](#) lists the PoE-bt power available in an EX4400-48MP switch.

**Table 71: PoE-bt Power Available in an EX4400-48MP Switch**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
1600 W	–	110 V	723 W
		230 V	1260 W
1600 W	1600 W	110 V	1746 W
		230 V	2200 W

[Table 72 on page 123](#) lists the PoE-bt power available in an EX4400-48MP switch if Junos OS Release 22.2R1 or earlier is installed in the switch.

**Table 72: PoE-bt Power Available in an EX4400-48MP Switch if Junos OS Release 22.2R1 or Earlier is Installed in the Switch**

Power Supply		Input Voltage	Available PoE-bt Power
1	2		
1600 W	–	110 V	750 W
		230 V	1300 W
1600 W	1600 W	110 V	1800 W
		230 V	2200 W

## DC Power Supply in EX4400 Switches

### IN THIS SECTION

- [Characteristics of the DC Power Supply | 124](#)
- [Specifications of the DC Power Supplies Used in EX4400 Switches | 127](#)
- [EX4400 DC Power Cable Specification | 128](#)
- [DC Power Supply Airflow | 131](#)
- [PoE-bt Budget Planning \(DC power supply\) | 132](#)

We ship the EX4400 switches with one power supply installed in the rear panel of the switches. You can install up to two power supplies in the switch. You must order the second power supply and a power source cord (part number: CBL-JNP-PWR-DSUB) separately. The power supply slots are numbered **0** and **1** and each slot has a power icon next to it. The power supplies support front-to-back or back-to-front airflow directions. The power supplies are fully redundant, load-sharing, and hot-removable and hot-insertable field-replaceable units (FRUs) when the second power supply is installed and running: You can remove and replace either one of them without powering off the switch or disrupting switch functions.



Do not mix:

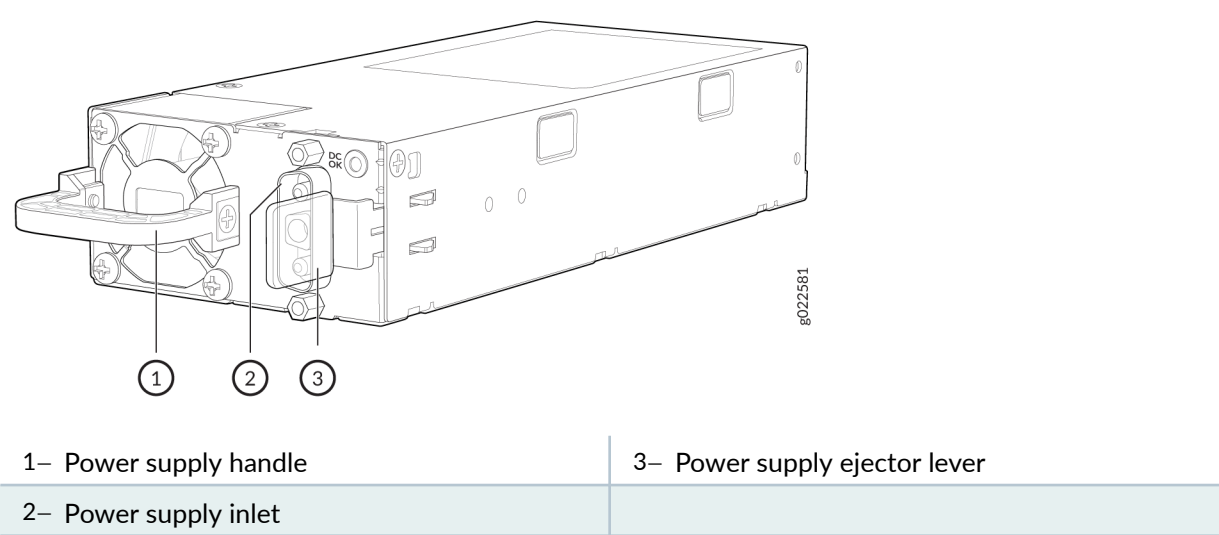
- AC and DC power supplies in the same chassis.
- Power supplies with different airflow directions in the same chassis.
- Fan modules with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

This topic describes the DC power supplies that EX4400 switches support.

Characteristics of the DC Power Supply

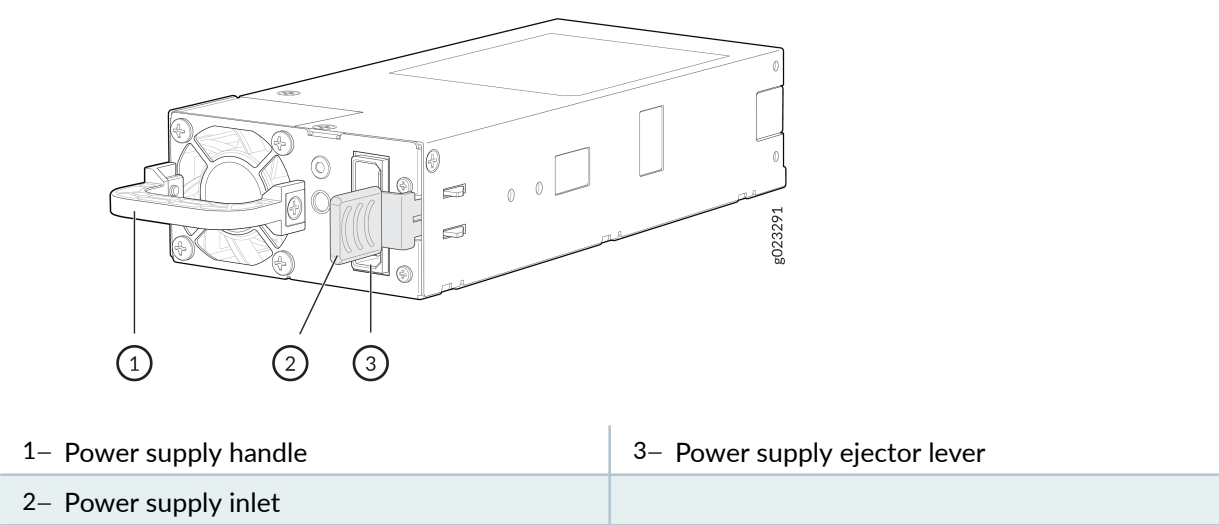
DC-powered EX4400-24T, EX4400-24X, EX4400-48T, and EX4400-48F switches support 550-W DC power supplies. See [Figure 84 on page 124](#).

Figure 84: 550 W DC Power Supply for EX4400 Switches



DC-powered EX4400-24P, EX4400-24MP, EX4400-48P, EX4400-48MP, EX4400-48XP, and EX4400-48MXP support 2000-W DC power supplies. See [Figure 85 on page 125](#).

Figure 85: 2000 W DC Power Supply for EX4400 Switches



The EX4400-48F-S switch supports the 550-W VDC power supplies.

Figure 86: 550 W VDC Power Supply for the EX4400-48F-S Switch

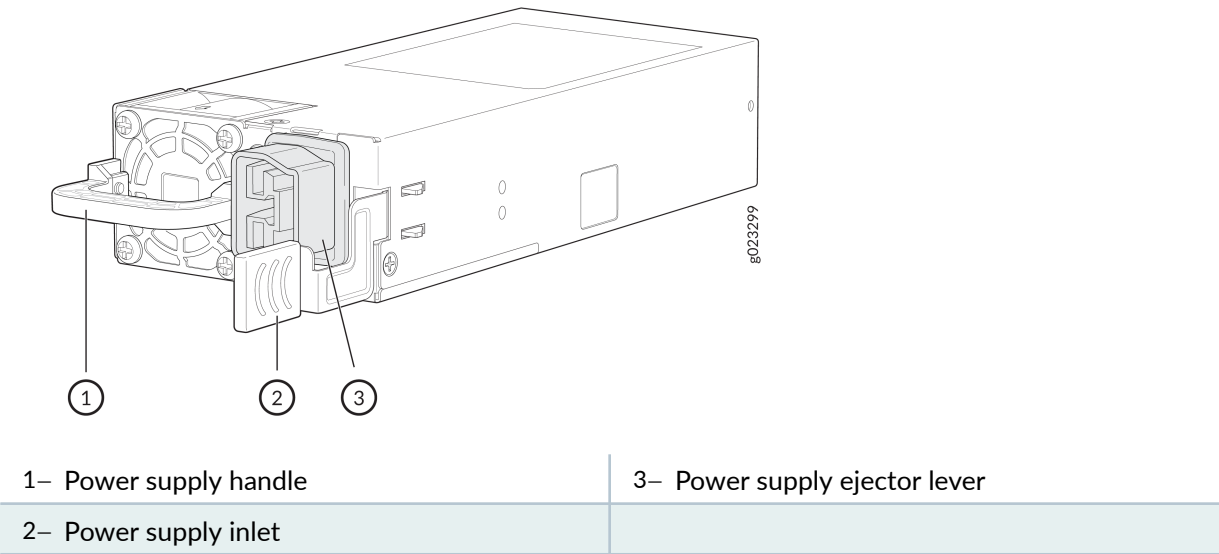


Table 73 on page 126 lists the details of the 550 W DC power supply used in EX4400 switches. Table 74 on page 126 lists the details of the 550 W VDC power supply used in the EX4400-48F-S switch, and Table 75 on page 126 lists the details of the 2000 W DC power supply used in EX4400 switches.

**Table 73: Details of the 550 W DC Power Supplies in EX4400 Switches**

Details	550-W DC Power Supplies
Model number	<ul style="list-style-type: none"> <li>• JPSU-550-C-DC-AFO</li> <li>• JPSU-550-C-DC-AFI</li> </ul>
Minimum installed in chassis	1
Maximum installed in chassis	2
Power supply status LED	DC.OK

**Table 74: Details of the 550 W VDC Power Supplies in the EX4400-48F-S Switch**

Details	550-W VDC Power Supplies
Model number	<ul style="list-style-type: none"> <li>• JPSU-550-C-VDC-AFO</li> </ul>
Minimum installed in chassis	1
Maximum installed in chassis	2
Power supply status LED	OUT.OK

**Table 75: Details of the 2000 W DC Power Supplies in EX4400 Switches**

Details	2000-W DC Power Supplies
Model number	<ul style="list-style-type: none"> <li>• JPSU-2000-DC-AFO</li> </ul>
Minimum installed in chassis	1
Maximum installed in chassis	2

**Table 75: Details of the 2000 W DC Power Supplies in EX4400 Switches (Continued)**

Details	2000-W DC Power Supplies
Power supply status LED	DC.OK

To prevent electrical injury while installing or removing DC power supplies, carefully follow instructions in ["Install a Power Supply in an EX4400 Switch" on page 242](#) and ["Remove a Power Supply from an EX4400 Switch" on page 240](#).

## Specifications of the DC Power Supplies Used in EX4400 Switches

[Table 76 on page 127](#) provides the power supply specifications of the 550-W DC power supplies.

[Table 77 on page 127](#) provides the power supply specifications of the 550-W VDC power supplies.

[Table 78 on page 128](#) provides the power supply specifications of the 2000-W DC power supplies.

**Table 76: Specifications of the 550-W DC Power Supplies Used in EX4400 Switches**

Item	Specification
DC input voltage	Rated operating voltage: -48 VDC through -60 VDC
DC input current rating	13 A
Output power	550 W

**Table 77: Specifications of the 550-W VDC Power Supplies Used in the EX4400-48F-S Switch**

Item	Specification
DC input voltage	Rated operating voltage: 120–310 VDC
DC input current rating	7 A
Output power	550 W

**Table 78: Specifications of the 2000-W DC Power Supplies Used in EX4400 Switches**

Item	Specification
DC input voltage	Rated operating voltage: -48 VDC through -60 VDC
DC input current rating	53 A
Output power	2000 W

### EX4400 DC Power Cable Specification

EX4400 DC power supplies require a D-Sub 3W3- type connector. The three pins on the connector provide -48 VDC input (-), return (+), and ground connections to the power supply.



**NOTE:** Regardless which DC power cable you use, you must connect the EX4400 to earth ground before you connect it to power.

DC power cables, each 4 m (approximately 13.1 ft) long, are supplied with the EX4400 switches. The provided cables include the three-pin connector on one end and three insulated wires at the opposite end, for connection to the site's DC power distribution system.

"EX4400 DC Power Cable Specification" on page 128 lists the specifications for the EX4400 DC power cables.

Table 80 on page 129 lists the power cable specifications of the 550-W VDC PSU used in the EX4400-48F-S switch model.

Table 81 on page 130 lists the specifications for the EX4400 2000-W DC PSU power cable.

**Table 79: EX4400 DC Power Cable Specifications**

Juniper Model	Wire Function	Insulation Color	Wire Size
CBL-JNP-PWR-DSUB (straight cable)	-48 VDC input (-)	Blue	8 AWG (8.4 mm <sup>2</sup> ), 90° C
	Return (+)	Black	8 AWG (8.4 mm <sup>2</sup> ), 90° C

**Table 79: EX4400 DC Power Cable Specifications (Continued)**

Juniper Model	Wire Function	Insulation Color	Wire Size
	Ground	Green and yellow	8 AWG (8.4 mm <sup>2</sup> ), 90° C
CBL-JNP-PWR-DSUB4 (straight cable)	-48 VDC input (-)	Blue	12 AWG (3.31 mm <sup>2</sup> ), 90° C
	Return (+)	Black	12 AWG (3.31 mm <sup>2</sup> ), 90° C
	Ground	Green and yellow	12 AWG (3.31 mm <sup>2</sup> ), 90° C

**Table 80: Power Cable Specifications for 550-W VDC PSU**

Country	Electrical Specifications	Juniper Model Number
Argentina	HVDC, 25A, 400V, 3m, SDG Straight Single End plug to Bare wire	CBL-EX-PWR-SDG-INT
Australia		
New Zealand		
China		
Europe		
South Korea		
Italy		
Switzerland		

**Table 80: Power Cable Specifications for 550-W VDC PSU (Continued)**

Country	Electrical Specifications	Juniper Model Number
Israel		
South Africa		
North America	HVDC, 25A, 400V, 3m, SDG Straight Single End plug to Bare wire	CBL-EX-PWR-SDG-US
India	HVDC, 25A, 400V, 3m, SDG Straight Single End plug to Bare wire	CBL-EX-PWR-SDG-IN
Taiwan	AC, SDG, Bare wire, 15A, 400V, 3m, Straight	CBL-EX-PWR-SDG-TW
Japan	AC, SDG, Bare wire, 15A, 400V, 3m, Straight	CBL-EX-PWR-SDG-JP

**Table 81: EX4400 DC Power Cable Specifications for 2000-W DC PSU**

Juniper Model	Wire Function	Insulation Color	Wire Size
CBL-PWR-2K-DSUB4	-48 VDC input (V-)	Black	6 AWG (13 mm <sup>2</sup> ), 85° C
	Return (V+)	Red	6 AWG (13 mm <sup>2</sup> ), 85° C



**NOTE:** CBL-JNP-PWR-DSUB4 (straight cable) can be separately ordered.  
CBL-PWR-2K-DSUB4 is 3.9 metres in length.



**NOTE:** The connector has 3 pins and the middle one is the Ground.



**WARNING:** For field-wiring connections, use copper conductors only.



**WARNING:** Power cables must not block access to components or drape where people could trip on them.



**CAUTION:** You must ensure that power connections maintain the proper polarity. The power source cables might be labeled **(+)** and **(-)** to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site might be different from the color coding for the leads on the DC power cable provided with the chassis.

### DC Power Supply Airflow

Each power supply has its own fan and is cooled by its own internal cooling system. EX4400 switches support power supplies with the following airflow directions:

- Front-to-back (cold air enters through the vents on the front panel of the switch and hot air exhausts through the vents on the rear panel), indicated by the **AIR OUT** label and the orange handle.
- Back-to-front (cold air enters through the vents on the rear panel of the switch and hot air exhausts through the vents on the front panel), indicated by the **AIR IN** label and the Juniper Azure Blue handle.

[Table 82 on page 131](#) lists the DC power supply models and the direction of airflow in them.

**Table 82: Airflow Direction in DC Power Supply Models for EX4400 Switches**

Model	Direction of Airflow
JPSU-550-C-DC-AFO JPSU-2000-C-DC-AFO JPSU-550-C-VDC-AFO	Front-to-back—that is, cold air enters the chassis through the vents on the front panel of the chassis and hot air exhausts through the vents on the rear panel of the chassis, indicated by the <b>AIR OUT</b> label and the orange handle.
JPSU-550-C-DC-AFI	Back-to-front—that is, cold air enters the chassis through the vents on the rear panel of the chassis and hot air exhausts through the vents on the front panel of the chassis, indicated by the <b>AIR IN</b> label and the Juniper Azure Blue handle.



## PoE-bt Budget Planning (DC power supply)

[Table 63 on page 118](#) lists the PoE-bt power available in an EX4400-24P switch with DC power supply.

**Table 83: PoE-bt Power Available in an EX4400-24P Switch**

Power Supply		Available PoE-bt Power
1	2	
2000 W	-	1710 W
2000 W	2000 W	2160 W

[Table 65 on page 119](#) lists the PoE-bt power available in an EX4400-24MP switch with DC power supply.

**Table 84: PoE-bt Power Available in an EX4400-24MP Switch**

Power Supply		Available PoE-bt Power
1	2	
2000 W	-	1680 W
2000 W	2000 W	2160 W

[Table 67 on page 120](#) lists the PoE-bt power available in an EX4400-48P switch with DC power supply.

**Table 85: PoE-bt Power Available in an EX4400-48P Switch**

Power Supply		Available PoE-bt Power
1	2	
2000 W	-	1700 W

**Table 85: PoE-bt Power Available in an EX4400-48P Switch (Continued)**

Power Supply		Available PoE-bt Power
1	2	
2000 W	2000 W	2200 W

[Table 86 on page 133](#) lists the PoE-bt power available in an EX4400-48XP switch with DC power supply.

**Table 86: PoE-bt Power Available in an EX4400-48XP Switch**

Power Supply		Available PoE-bt Power
1	2	
2000 W	–	1650 W
2000 W	2000 W	3600 W

[Table 87 on page 133](#) lists the PoE-bt power available in an EX4400-48MXP switch with DC power supply.

**Table 87: PoE-bt Power Available in an EX4400-48MXP Switch**

Power Supply		Available PoE-bt Power
1	2	
2000 W	–	1650 W
2000 W	2000 W	3600 W

[Table 71 on page 122](#) lists the PoE-bt power available in an EX4400-48MP switch with DC power supply.

**Table 88: PoE-bt Power Available in an EX4400-48MP Switch**

Power Supply		Available PoE-bt Power
1	2	
2000 W	–	1650 W
2000 W	2000 W	2200 W

## Power Supply LEDs in EX4400 Switches

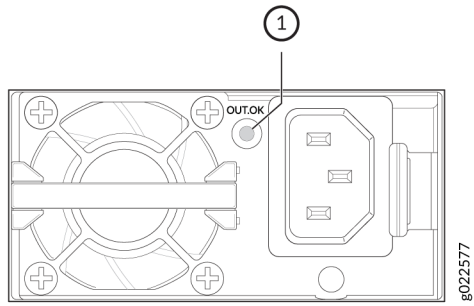
### IN THIS SECTION

- [EX4400 AC Power Supply Ratings and PoE Budget in Watts | 138](#)
- [EX4400 DC Power Supply Ratings and PoE Budget in Watts | 139](#)

The power supplies for EX4400 switches have one LED that indicates its state.

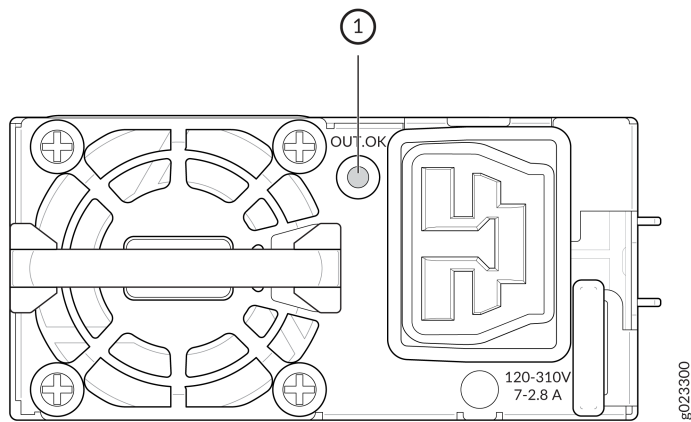
- [Figure 87 on page 135](#) shows the LED on the 550-W AC power supply for EX4400 switches.
- [Figure 88 on page 135](#) shows the LED on the 550-W VDC power supply for the EX4400-48F-S switch.
- [Figure 89 on page 135](#) shows the LED on the 1050-W AC power supply for EX4400 switches.
- [Figure 90 on page 136](#) shows the LED on the 1600-W AC power supply for EX4400 switches.
- [Figure 91 on page 136](#) shows the LED on the 2000-W AC power supply for EX4400 switches.
- [Figure 93 on page 137](#) shows the LED on the 2000-W DC power supply for EX4400 switches.
- [Figure 92 on page 136](#) shows the LED on the 550-W DC power supply for EX4400 switches.

**Figure 87: LED on the 550-W AC Power Supply for EX4400 Switches**



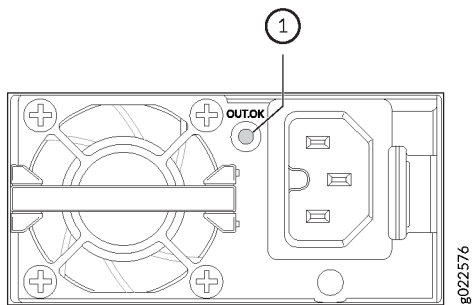
1– Power supply LED

**Figure 88: LED on the 550-W VDC Power Supply**



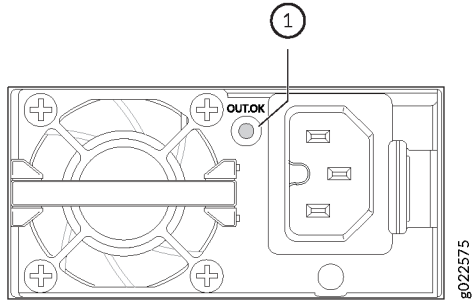
1– Power supply LED

**Figure 89: LED on the 1050-W AC Power Supply for EX4400 Switches**



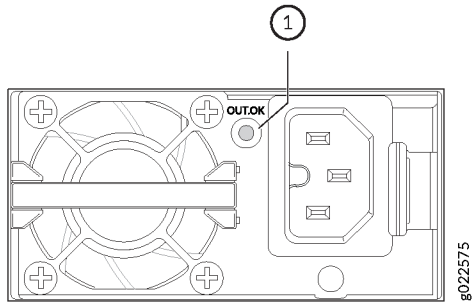
1– Power supply LED

**Figure 90: LED on the 1600-W AC Power Supply for EX4400 Switches**



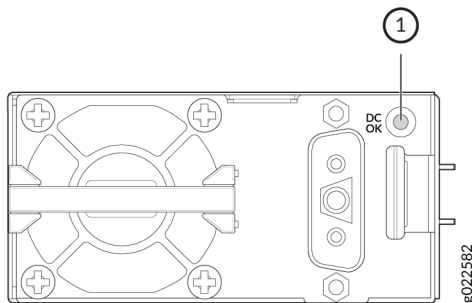
1– Power supply LED

**Figure 91: LED on the 2000-W AC Power Supply for EX4400 Switches**



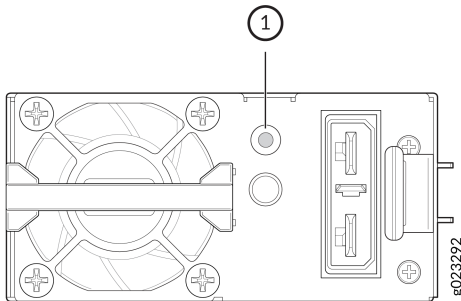
1– Power supply LED

**Figure 92: LED on the 550-W DC Power Supply for EX4400 Switches**



1– Power supply LED

Figure 93: LED on the 2000-W DC Power Supply for EX4400 Switches



1– Power supply LED

Table 89 on page 137 describes the power supply LED.

Table 89: Power Supply LED in EX4400 Switches

Color	State	Description
Green	On steadily	The power supply is receiving input and is providing proper output to the switch.
	Blinking	The fan in the power supply has failed or there is an internal communication failure in the power supply; you must replace it.
	Unlit	Indicates one of the following: <ul style="list-style-type: none"><li>• The power cord might not be installed properly.</li><li>• The power supply is not receiving power correctly. Verify that the input voltage range is correct.</li><li>• The power supply is in standby mode.</li><li>• The ambient temperature is high and the power supply has shut down. Ensure that the temperature is between 32° F and 113° F (between 0° C and 45° C).</li><li>• There is a critical failure in the power supply and it has shut down. You must replace it.</li></ul>

## EX4400 AC Power Supply Ratings and PoE Budget in Watts

Table 90: EX4400 AC Power Supply Ratings and PoE Budget in Watts

Model	Power Supply Ratings	PoE Budget	
		220 V (1 PSU / 2 PSU)	110 V (1 PSU / 2 PSU)
EX4400-48XP	2000 W AC	1650 W/3600 W	724 W/ 1748 W
EX4400-48P	1600 W AC	1310 W / 2200 W	773 W/ 1796 W
EX4400-24P	1050 W AC	783 W / 1806 W	783 W/ 1806 W
EX4400-24P-S	1600 W AC	1320 W/ 2160 W	783 W/ 1806 W
EX4400-24MP	1050 W AC	753 W/ 1776 W	753 W/ 1776 W
EX4400-24MP-S	1600 W AC	1290 W / 2160 W	753 W/ 1776 W
EX4400-48MXP	2000 W AC	1650 W/ 3600 W	724 W/ 1748 W
EX4400-48MP	1600 W AC	1260 W/ 2200 W	723 W/ 1746 W



**NOTE:** EX4400-24P, EX4400-24MP, EX4400-48P, and EX4400-48MP are not supported with 2000 W AC PSU.

## EX4400 DC Power Supply Ratings and PoE Budget in Watts

Table 91: EX4400 DC Power Supply Ratings and PoE Budget in Watts

Model	Power Supply Rating	PoE Budget
		48-60 V (1 PSU / 2 PSU)
EX4400-48XP-S	2000 W DC	1650 W / 3600 W
EX4400-48P-S	2000 W DC	1700 W / 2200 W
EX4400-24P-S	2000 W DC	1710 W / 2160 W
EX4400-24MP-S	2000 W DC	1680 W / 2160 W
EX4400-48MXP-S	2000 W DC	1600 W / 3600 W
EX4400-48MP-S	2000 W DC	1650 W / 2200 W



# 3

CHAPTER

## Site Planning and Preparation

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### IN THIS CHAPTER

- Site Preparation Checklist for EX4400 Switches | **141**
  - EX4400 Site Guidelines and Requirements | **144**
  - EX4400 Network Cable and Transceiver Planning | **150**
  - EX4400 Management Cable Specifications and Pinouts | **162**
-

# Site Preparation Checklist for EX4400 Switches

The checklist in [Table 92 on page 141](#) summarizes the tasks you need to perform when preparing a site for EX4400 switch installation.

**Table 92: Site Preparation Checklist**

Item or Task	For More Information	Performed by	Date
<b>Environment</b>			
Verify that environmental factors such as temperature and humidity do not exceed switch tolerances.	<a href="#">"Environmental Requirements and Specifications for EX4400 Switches" on page 144</a>		
<b>Power</b>			
Measure the distance between external power sources and the switch installation site.	<a href="#">"Clearance Requirements for Hardware Maintenance for EX4400 Switches" on page 149</a>		
Locate sites to connect system grounding.			
Calculate the power consumption and requirements.	<ul style="list-style-type: none"> <li>• <a href="#">"AC Power Supply in EX4400 Switches" on page 105</a></li> <li>• <a href="#">"DC Power Supply in EX4400 Switches" on page 123</a></li> </ul>		
<b>Hardware Configuration</b>			
Choose the number and types of switches you want to install.	<a href="#">"EX4400 Switches Hardware Overview" on page 8</a>		
<b>Rack or Cabinet</b>			

Table 92: Site Preparation Checklist *(Continued)*

Item or Task	For More Information	Performed by	Date
Verify that the rack or cabinet meets the minimum requirements for installing the switch.	<ul style="list-style-type: none"><li>• <a href="#">"Rack Requirements" on page 147</a></li><li>• <a href="#">"Cabinet Requirements" on page 147</a></li></ul>		
Plan rack or cabinet location, including required space clearances.			
Secure the rack or cabinet to the floor and building structure.			
<b>Cables</b>			

Table 92: Site Preparation Checklist (*Continued*)

Item or Task	For More Information	Performed by	Date
<p>Acquire cables and connectors:</p> <ul style="list-style-type: none"> <li>• Determine the number of cables needed based on your planned configuration.</li> <li>• Review the maximum distance allowed for each cable. Choose the length of the cable based on the distance between the hardware components being connected.</li> </ul> <p><b>NOTE:</b> The Ethernet cables to connect to the RJ-45 network ports on EX4400-24P, EX4400-24MP, EX4400-48P, and EX4400-48MP switches provide 90-W power over 4-pair wire. To ensure that the cables do not exceed the rated temperature and ampacity and to ensure proper operation, the cables must meet the following specifications related to deployment, temperature rise, category, IEEE, UL, NEC, and local electric codes:</p> <ul style="list-style-type: none"> <li>• The cables must be rated for IEEE 802.3 BT, TIA standards, and UL-LP.</li> <li>• The cables must follow NEC 725.144 article and local electric code.</li> <li>• The operating temperature of the cable must be rated at 15° C more than the ambient temperature.</li> </ul>			

**Table 92: Site Preparation Checklist** *(Continued)*

Item or Task	For More Information	Performed by	Date
Plan the cable routing and management.			

# EX4400 Site Guidelines and Requirements

## IN THIS SECTION

- [Environmental Requirements and Specifications for EX4400 Switches | 144](#)
- [General Site Guidelines | 145](#)
- [Site Electrical Wiring Guidelines | 146](#)
- [Rack Requirements | 147](#)
- [Cabinet Requirements | 147](#)
- [Clearance Requirements for Hardware Maintenance for EX4400 Switches | 149](#)

## Environmental Requirements and Specifications for EX4400 Switches

You must install the switch in a rack or cabinet. You must house it in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- Keep the site as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the switch cooling system.
- Maintain ambient airflow for normal switch operation. If the airflow is blocked or restricted, or if the intake air is too warm, the switch might overheat, leading to the switch temperature monitor shutting down the device to protect the hardware components.

[Table 93 on page 145](#) provides the required environmental conditions for normal switch operation for EX4400.

**Table 93: EX4400 Environmental Tolerances**

Altitude	Relative Humidity	Temperature	Seismic
No performance degradation up to 6000 feet at 104° F (1828.8 meters at 40° C)	Normal operation ensured in relative humidity range of 5% through 90%, noncondensing	<ul style="list-style-type: none"> <li>Normal operation ensured in temperature range of 32° F through 113° F (0° C through 45° C)</li> <li>Nonoperating storage temperature in shipping container: -40° F through 158° F (-40° C through 70° C)</li> </ul>	Tested for Zone 4 earthquake according to NEBS GR-63-CORE, Issue 5.



**NOTE:** Install the EX4400 only in restricted-access areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70. Only skilled and instructed persons must access the device.

## General Site Guidelines

Efficient device operation requires proper site planning. For the device to operate properly, you must ensure maintenance and proper layout of the equipment, rack or cabinet, and wiring closet.

To plan and create an acceptable operating environment for your device and prevent environmentally caused equipment failures:

- Keep the area around the chassis free from dust and conductive material, such as metal flakes.
- Follow the prescribed airflow guidelines to ensure that the cooling system functions properly. Ensure that the exhaust from other equipment does not blow into the intake vents of the device.
- Follow the prescribed electrostatic discharge (ESD) prevention procedures to prevent damaging the equipment. Static discharge can cause components to fail completely or intermittently over time.
- Install the device in a secure area, so that only authorized personnel can access the device.

## Site Electrical Wiring Guidelines

Table 94 on page 146 describes the factors you must consider while planning the electrical wiring at your site.



**WARNING:** You must provide a properly grounded and shielded environment and use electrical surge-suppression devices.

**Avertissement** Vous devez établir un environnement protégé et convenablement mis à la terre et utiliser des dispositifs de parasurtension.

**Table 94: Site Electrical Wiring Guidelines**

Site Wiring Factor	Guidelines
Signaling limitations	<p>If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding:</p> <ul style="list-style-type: none"> <li>• Radio frequency interference (RFI) because of improperly installed wires.</li> <li>• Damage from lightning strikes occurring when wires exceed recommended distances or pass between buildings.</li> <li>• Damage to unshielded conductors and electronic devices as a result of electromagnetic pulses (EMPs) caused by lightning.</li> </ul>
Radio frequency interference	<p>To reduce or eliminate RFI from your site wiring, do the following:</p> <ul style="list-style-type: none"> <li>• Use a twisted-pair cable with a good distribution of grounding conductors.</li> <li>• If you need to exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal, when applicable.</li> </ul>
Electromagnetic compatibility	<p>If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice.</p> <p>Strong sources of electromagnetic interference (EMI) can cause:</p> <ul style="list-style-type: none"> <li>• Destruction of the signal drivers and receivers in the device.</li> <li>• Electrical hazards as a result of power surges conducted over the lines into the equipment.</li> </ul>

## Rack Requirements

You can mount the device on two-post racks or four-post racks.

Rack Requirement	Guidelines
Rack type	<p>A U is the standard rack unit defined by the Electronic Components Industry Association (ECIA) (<a href="http://www.ecianow.org">http://www.ecianow.org</a>).</p> <p>You can mount the device on a rack that provides bracket holes or hole patterns spaced at 1U (1.75 in. or 4.45 cm) increments and meets the size and strength requirements to support the weight.</p>
Mounting bracket hole spacing	The holes in the mounting brackets are spaced at 1U (1.75 in. or 4.45 cm) so that the device can be mounted in any rack that provides holes spaced at that distance.
Rack size and strength	<p>Ensure that the:</p> <ul style="list-style-type: none"> <li>• Rack complies with the size and strength standards of a 19-in. rack as defined by the ECIA (<a href="http://www.ecianow.org">http://www.ecianow.org</a>).</li> <li>• Rack rails are spaced widely enough to accommodate the external dimensions of the device chassis. Also ensure that the outer edges of the front mounting brackets extend the width of the chassis to 19 in. (48.2 cm).</li> <li>• Rack is strong enough to support the weight of the device.</li> <li>• Spacing of rails and adjacent racks provides for proper clearance around the device and rack.</li> </ul>
Rack connection to building structure	<ul style="list-style-type: none"> <li>• Secure the rack to the building structure.</li> <li>• If your geographical area is earthquake-prone, secure the rack to the floor.</li> <li>• Secure the rack to the ceiling brackets as well as wall or floor brackets for maximum stability.</li> </ul>

## Cabinet Requirements

You can mount the device in a cabinet that contains a 19-in. rack.



**Table 95: Cabinet Requirements and Specifications**

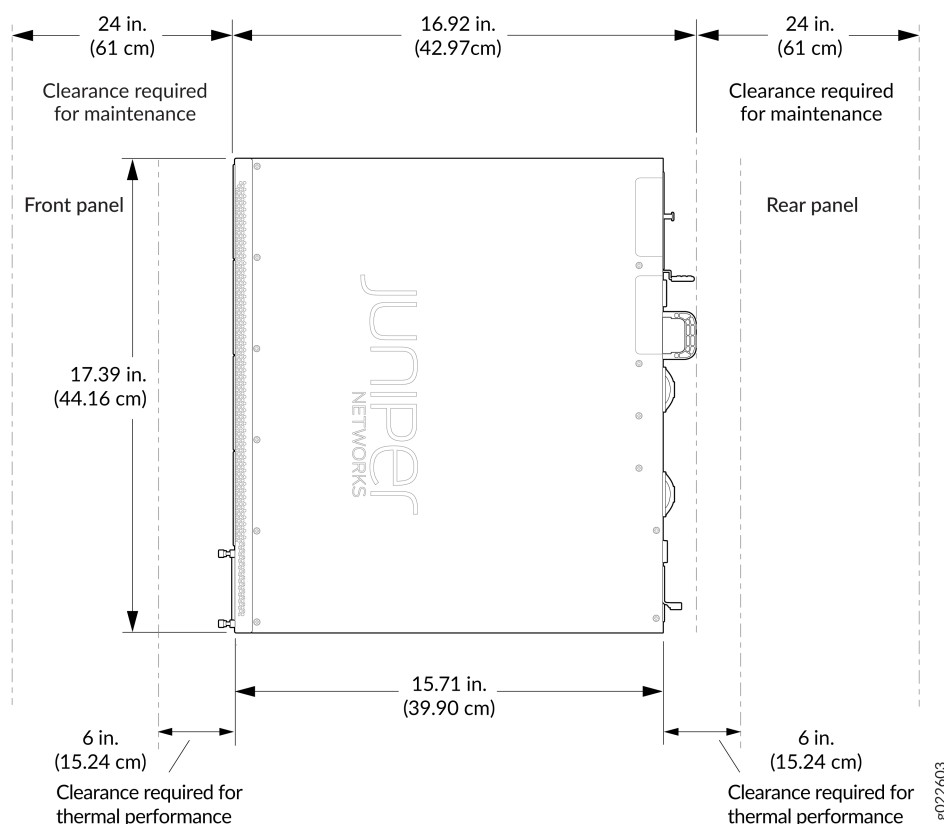
Cabinet Requirement	Guidelines
Cabinet size and clearance	<ul style="list-style-type: none"> <li>• The minimum cabinet size is 27.7 in. (70.35 cm) between cabinet front door and cabinet rear wall. It is recommended to have minimum of 6 in. clearance from the cabinet front door and switch front panel minimum of 6 in. clearance from the cabinet rear wall and switch rear panel. Large cabinets improve airflow and reduce chances of overheating.</li> <li>• The outer edges of the front mounting brackets extend the width of the chassis to 19 in. (48.2 cm).</li> </ul>
Cabinet airflow requirements	<p>When you mount the device in a cabinet:</p> <ul style="list-style-type: none"> <li>• Ensure that ventilation through the cabinet is sufficient to prevent overheating.</li> <li>• Ensure that there is adequate cool air supply to dissipate the thermal output of the device or devices.</li> <li>• Ensure that the hot air exhaust of the chassis exits the cabinet without recirculating into the device. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top ensures the best airflow through the chassis. If the cabinet contains a top or doors, perforations in these elements assist with removing the hot air exhaust.</li> <li>• Install the device in the cabinet in a way that maximizes the open space on the side of the chassis that has the hot air exhaust.</li> <li>• Route and secure all cables to minimize the blockage of airflow to and from the chassis.</li> <li>• Ensure that the spacing of rails and adjacent cabinets is such that proper clearance exists around the device and cabinet.</li> <li>• A cabinet larger than the minimum required provides better airflow and reduces the chance of overheating.</li> </ul>

## Clearance Requirements for Hardware Maintenance for EX4400 Switches

When planning the site for installing an EX4400 switch, follow these clearance requirements (see [Figure 94 on page 149](#)):

- For the cooling system to function properly, ensure that the airflow around the chassis is unrestricted.
- If you are mounting the switch on a rack or cabinet along with other equipment, ensure that the hot air exhaust from other equipment does not blow into the cold air intake vents of the chassis.
- Leave at least 6 in. (15.2 cm) clearance in front of and behind the chassis for airflow.
- Leave at least 24 in. (61 cm) clearance in front of and behind the switch for service personnel to remove and install hardware components.

**Figure 94: Clearance Requirements for Hardware Maintenance for EX4400 (AFO and AFI) Switches**



# EX4400 Network Cable and Transceiver Planning

## IN THIS SECTION

- [Pluggable Transceivers and Cables Supported on EX4400 Switches | 150](#)
- [RJ-45 Port, SFP Port, SFP+ Port, QSFP+ Port, and QSFP28 Port Connector Pinout Information | 151](#)
- [Overview of EX Series Switches: Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion | 158](#)
- [Calculate the Fiber-Optic Cable Power Budget for EX Series Devices | 159](#)
- [Calculating the Fiber-Optic Cable Power Margin for EX Series Devices | 160](#)

## Pluggable Transceivers and Cables Supported on EX4400 Switches

You can find the list of transceivers and cables supported on EX4400 switches and information about those transceivers and cables at the [Hardware Compatibility Tool page for EX4400](#).



**NOTE:** We recommend that you use only optical transceivers, optical connectors, and cables purchased from Juniper Networks with your Juniper Networks device.



**CAUTION:** If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.



**CAUTION:** The Juniper Networks Technical Assistance Center (JTAC) provides complete support for Juniper-supplied optical modules and cables. However, JTAC does not provide support for third-party optical modules and cables that are not qualified or supplied by Juniper Networks. If you face a problem running a Juniper device that uses third-party optical modules or cables, JTAC may help you diagnose host-related issues if the observed issue is not, in the opinion of JTAC, related to the use of the third-party optical modules or cables. Your JTAC engineer will likely request that you check the

third-party optical module or cable and, if required, replace it with an equivalent Juniper-qualified component.

Use of third-party optical modules with high-power consumption (for example, coherent ZR or ZR+) can potentially cause thermal damage to or reduce the lifespan of the host equipment. Any damage to the host equipment due to the use of third-party optical modules or cables is the users' responsibility. Juniper Networks will accept no liability for any damage caused due to such use.

The Gigabit Ethernet transceivers installed in EX4400 switches support digital optical monitoring (DOM): You can view the diagnostic details for these transceivers by issuing the operational mode CLI command `show interfaces diagnostics optics`.



**NOTE:** The transceivers support DOM even if they are installed in ports configured as Virtual Chassis ports (VCPs).

## RJ-45 Port, SFP Port, SFP+ Port, QSFP+ Port, and QSFP28 Port Connector Pinout Information

The tables in this topic describe the connector pinout information for the RJ-45, QSFP+, QSFP28, SFP+, and SFP ports.

- [Table 96 on page 151](#)—10/100/1000BASE-T Ethernet network port connector pinout information
- [Table 97 on page 152](#)—SFP network port connector pinout information
- [Table 98 on page 154](#)—SFP+ network port connector pinout information
- [Table 99 on page 155](#)—QSFP+ and QSFP28 network module ports connector pinout information

**Table 96: 10/100/1000BASE-T Ethernet Network Port Connector Pinout Information**

Pin	Signal	Description
1	TRP1+	Transmit/receive data pair 1  Negative Vport (in PoE models)

**Table 96: 10/100/1000BASE-T Ethernet Network Port Connector Pinout Information (Continued)**

Pin	Signal	Description
2	TRP1-	Transmit/receive data pair 1 Negative Vport (in PoE models)
3	TRP2+	Transmit/receive data pair 2 Positive Vport (in PoE models)
4	TRP3+	Transmit/receive data pair 3
5	TRP3-	Transmit/receive data pair 3
6	TRP2-	Transmit/receive data pair 2 Positive Vport (in PoE models)
7	TRP4+	Transmit/receive data pair 4
8	TRP4-	Transmit/receive data pair 4

**Table 97: SFP Network Port Connector Pinout Information**

Pin	Signal	Description
1	VeeT	Module transmitter ground
2	TX_Fault	Module transmitter fault
3	TX_Disable	Transmitter disabled
4	SDA	2-wire serial interface data line
5	SCL-	2-wire serial interface clock

**Table 97: SFP Network Port Connector Pinout Information** *(Continued)*

Pin	Signal	Description
6	MOD_ABS	Module absent
7	RS	Rate select
8	RX_LOS	Receiver loss of signal indication
9	VeeR	Module receiver ground
10	VeeR	Module receiver ground
11	VeeR	Module receiver ground
12	RD-	Receiver inverted data output
13	RD+	Receiver noninverted data output
14	VeeR	Module receiver ground
15	VccR	Module receiver 3.3 V supply
16	VccT	Module transmitter 3.3 V supply
17	VeeT	Module transmitter ground
18	TD+	Transmitter noninverted data input
19	TD-	Transmitter inverted data input
20	VeeT	Module transmitter ground

**Table 98: SFP+ Network Port Connector Pinout Information**

Pin	Signal	Description
1	VeeT	Module transmitter ground
2	TX_Fault	Module transmitter fault
3	TX_Disable	Transmitter disabled
4	SDA	2-wire serial interface data line
5	SCL-	2-wire serial interface clock
6	MOD_ABS	Module absent
7	RS0	Rate select 0, optionally controls SFP+ module receiver
8	RX_LOS	Receiver loss of signal indication
9	RS1	Rate select 1, optionally controls SFP+ transmitter
10	VeeR	Module receiver ground
11	VeeR	Module receiver ground
12	RD-	Receiver inverted data output
13	RD+	Receiver noninverted data output
14	VeeR	Module receiver ground
15	VccR	Module receiver 3.3-V supply

**Table 98: SFP+ Network Port Connector Pinout Information (Continued)**

Pin	Signal	Description
16	VccT	Module transmitter 3.3-V supply
17	VeeT	Module transmitter ground
18	TD+	Transmitter noninverted data input
19	TD-	Transmitter inverted data input
20	VeeT	Module transmitter ground

**Table 99: QSFP+ and QSFP28 Network Port Connector Pinout Information**

Pin	Signal
1	GND
2	TX2n
3	TX2p
4	GND
5	TX4n
6	TX4p
7	GND
8	ModSelL
9	LPMode_Reset



Table 99: QSFP+ and QSFP28 Network Port Connector Pinout Information *(Continued)*

Pin	Signal
10	VccRx
11	SCL
12	SDA
13	GND
14	RX3p
15	RX3n
16	GND
17	RX1p
18	RX1n
19	GND
20	GND
21	RX2n
22	RX2p
23	GND
24	RX4n

Table 99: QSFP+ and QSFP28 Network Port Connector Pinout Information *(Continued)*

Pin	Signal
25	RX4p
26	GND
27	ModPrsL
28	IntL
29	VccTx
30	Vcc1
31	Reserved
32	GND
33	TX3p
34	TX3n
35	GND
36	TX1p
37	TX1n
38	GND

## Overview of EX Series Switches: Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion

### IN THIS SECTION

- [Signal Loss in Multimode and Single-Mode Fiber-Optic Cable | 158](#)
- [Attenuation and Dispersion in Fiber-Optic Cable | 158](#)

To determine the power budget and power margin needed for fiber-optic connections, you need to understand how signal loss, attenuation, and dispersion affect transmission. EX Series switches use various types of network cables, including multimode and single-mode fiber-optic cable.

### Signal Loss in Multimode and Single-Mode Fiber-Optic Cable

Multimode fiber is large enough in diameter to allow rays of light to reflect internally (bounce off the walls of the fiber). Interfaces with multimode optics typically use LEDs as light sources. However, LEDs are not coherent light sources. They spray varying wavelengths of light into the multimode fiber, which reflects the light at different angles. Light rays travel in jagged lines through a multimode fiber, causing signal dispersion. When light traveling in the fiber core radiates into the fiber), higher-order mode loss (HOL) occurs. (Cladding consists of layers of lower-refractive index material in close contact with a core material of higher refractive index.) Together, these factors reduce the transmission distance of multimode fiber compared to that of single-mode fiber.

Single-mode fiber is so small in diameter that rays of light reflect internally through one layer only. Interfaces with single-mode optics use lasers as light sources. Lasers generate a single wavelength of light, which travels in a straight line through the single-mode fiber. Compared to multimode fiber, single-mode fiber has a higher bandwidth and can carry signals for longer distances. Single-mode fiber is consequently more expensive than multimode fiber.

Exceeding the maximum transmission distances can result in significant signal loss, which causes unreliable transmission.

### Attenuation and Dispersion in Fiber-Optic Cable

An optical data link functions correctly provided that modulated light reaching the receiver has enough power to be demodulated correctly. *Attenuation* is the reduction in strength of the light signal during transmission. Passive media components such as cables, cable splices, and connectors cause attenuation. Although attenuation is significantly lower for optical fiber than for other media, it still

occurs in both multimode and single-mode transmissions. An efficient optical data link must transmit enough light to overcome attenuation.

*Dispersion* is the spreading of the signal over time. The following two types of dispersion can affect signal transmission through an optical data link:

- Chromatic dispersion, which is the spreading of the signal over time caused by the different speeds of light rays
- Modal dispersion, which is the spreading of the signal over time caused by the different propagation modes in the fiber

For multimode transmission, modal dispersion usually limits the maximum bit rate and link length. Chromatic dispersion or attenuation is not a factor.

For single-mode transmission, modal dispersion is not a factor. However, at higher bit rates and over longer distances, chromatic dispersion limits the maximum link length.

An efficient optical data link must have enough light to exceed the minimum power that the receiver requires to operate within its specifications. In addition, the total dispersion must be within the limits specified for the type of link in Telcordia Technologies document GR-253-CORE (Section 4.3) and International Telecommunications Union (ITU) document G.957.

When chromatic dispersion is at the maximum allowed, you can consider its effect as a power penalty in the power budget. The optical power budget must allow for the sum of component attenuation, power penalties (including those from dispersion), and a safety margin for unexpected power loss.

## Calculate the Fiber-Optic Cable Power Budget for EX Series Devices

To ensure that fiber-optic connections have sufficient power for correct operation, calculate the link's power budget when planning fiber-optic cable layout and distances. This planning helps you ensure that fiber-optic connections have sufficient power for correct operation. The power budget is the maximum amount of power the link can transmit. When you calculate the power budget, you use a worst-case analysis to provide a margin of error. You use a worst-case analysis even though not all the parts of an actual system operate at the worst-case levels.

To calculate the worst-case estimate for a fiber-optic cable power budget ( $P_B$ ) for the link:

1. Determine values for the link's minimum transmitter power ( $P_T$ ) and minimum receiver sensitivity ( $P_R$ ). In the following example, we measure both ( $P_T$ ) and ( $P_R$ ) in decibels relative to one milliwatt (dBm).

$$P_T = -15 \text{ dBm}$$

$$P_R = -28 \text{ dBm}$$



**NOTE:** See the specifications for your transmitter and receiver to find the minimum transmitter power and minimum receiver sensitivity.

2. Calculate the power budget ( $P_B$ ) by subtracting ( $P_R$ ) from ( $P_T$ ):

$$-15 \text{ dBm} - (-28 \text{ dBm}) = 13 \text{ dBm}$$

## Calculating the Fiber-Optic Cable Power Margin for EX Series Devices

Before calculating the power margin, calculate the power budget (see [Calculating the Fiber-Optic Cable Power Budget for EX Series Devices](#)).

Calculate the link's power margin when planning fiber-optic cable layout and distances to ensure that fiber-optic connections have sufficient signal power to overcome system loss and still satisfy the minimum input requirements of the receiver for the required performance level. The power margin ( $P_M$ ) is the amount of power available after you subtract attenuation or link loss ( $LL$ ) from the power budget ( $P_B$ ).

When you calculate the power margin, you use a worst-case analysis to provide a margin of error, even though not all parts of an actual system operate at worst-case levels. A power margin ( $P_M$ ) greater than zero indicates that the power budget is sufficient to operate the receiver and that it does not exceed the maximum receiver input power. This means that the link will work. A ( $P_M$ ) that is zero or negative indicates insufficient power to operate the receiver. See the specification for your receiver to find the maximum receiver input power.

To calculate the worst-case estimate for the power margin ( $P_M$ ) for the link:

1. Determine the maximum value for link loss ( $LL$ ) by adding estimated values for applicable link-loss factors—for example, use the sample values for various factors as provided in [Table 100 on page 160](#) (here, the link is 2 km long and multimode, and the ( $P_B$ ) is 13 dBm):

**Table 100: Estimated Values for Factors Causing Link Loss**

Link-Loss Factor	Estimated Link-Loss Value	Sample (LL) Calculation Values
Higher-order mode losses (HOL)	<ul style="list-style-type: none"> <li>• Multimode—0.5 dBm</li> <li>• Single mode—None</li> </ul>	<ul style="list-style-type: none"> <li>• 0.5 dBm</li> <li>• 0 dBm</li> </ul>

Table 100: Estimated Values for Factors Causing Link Loss *(Continued)*

Link-Loss Factor	Estimated Link-Loss Value	Sample (LL) Calculation Values
Modal and chromatic dispersion	<ul style="list-style-type: none"> <li>Multimode—None, if product of bandwidth and distance is less than 500 MHz/km</li> <li>Single mode—None</li> </ul>	<ul style="list-style-type: none"> <li>0 dBm</li> <li>0 dBm</li> </ul>
Connector	0.5 dBm	This example assumes 5 connectors. Loss for 5 connectors: $(5) * (0.5 \text{ dBm}) = 2.5 \text{ dBm}$
Splice	0.5 dBm	This example assumes 2 splices. Loss for two splices: $(2) * (0.5 \text{ dBm}) = 1 \text{ dBm}$
Fiber attenuation	<ul style="list-style-type: none"> <li>Multimode—1 dBm/km</li> <li>Single mode—0.5 dBm/km</li> </ul>	This example assumes the link is 2 km long. Fiber attenuation for 2 km: <ul style="list-style-type: none"> <li><math>(2 \text{ km}) * (1.0 \text{ dBm/km}) = 2 \text{ dBm}</math></li> <li><math>(2 \text{ km}) * (0.5 \text{ dBm/km}) = 1 \text{ dBm}</math></li> </ul>
Clock Recovery Module (CRM)	1 dBm	1 dBm



**NOTE:** For information about the actual amount of signal loss caused by equipment and other factors, see your vendor documentation for that equipment.

2. Calculate the  $(P_M)$  by subtracting  $(LL)$  from  $(P_B)$ :

$$P_B - LL = P_M$$

$$(13 \text{ dBm}) - (0.5 \text{ dBm [HOL]}) - ((5) * (0.5 \text{ dBm})) - ((2) * (0.5 \text{ dBm})) - ((2 \text{ km}) * (1.0 \text{ dBm/km})) - (1 \text{ dB [CRM]}) = P_M$$

$$13 \text{ dBm} - 0.5 \text{ dBm} - 2.5 \text{ dBm} - 1 \text{ dBm} - 2 \text{ dBm} - 1 \text{ dBm} = P_M$$

$$P_M = 6 \text{ dBm}$$

The calculated power margin is greater than zero, indicating that the link has sufficient power for transmission. Also, the power margin value does not exceed the maximum receiver input power. Refer to the specification for your receiver to find the maximum receiver input power.

# EX4400 Management Cable Specifications and Pinouts

## IN THIS SECTION

- [Management Cable Specifications | 162](#)
- [Console Port Connector Pinout Information | 163](#)
- [USB Port Specifications for an EX Series Switch | 164](#)
- [RJ-45 Management Port Connector Pinout Information | 165](#)
- [RJ-45 to DB-9 Serial Port Adapter Pinout Information | 166](#)

## Management Cable Specifications

[Table 101 on page 162](#) lists the specifications for the cables that connect the console and management ports to management devices.

**Table 101: Specifications of Cables to Connect to Management Devices**

Ports	Cable Specifications	Receptacle	Additional Information
RJ-45 Console port	Rollover cable	RJ-45	<i>Connect a Device to a Management Console Using an RJ-45 Connector</i>
Management Ethernet port	Ethernet cable with an RJ-45 connector	RJ-45	<i>Connect a Device to a Network for Out-of-Band Management</i>

**Table 101: Specifications of Cables to Connect to Management Devices (Continued)**

Ports	Cable Specifications	Receptacle	Additional Information
Mini-USB Type-B Console port	Mini-USB cable with standard-A and Mini-USB Type-B (5-pin) connector	Mini-USB	

## Console Port Connector Pinout Information

The console port on a Juniper Networks device is an RS-232 serial interface that uses an RJ-45 connector to connect to a console management device. The default baud rate for the console port is 9600 baud.

Table 102 on page 164 provides the pinout information for the RJ-45 console connector.



**NOTE:** We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device package, or if you need a different type of adapter, you can order the following separately:

- RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
- RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
- RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)

If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See, <https://ftdichip.com/drivers/vcp-drivers/> to download the driver.



**NOTE:** If your laptop or desktop PC does not have a DB-9 plug connector pin and you want to connect your laptop or desktop PC directly to a device, use a combination of the RJ-45-to-DB-9 socket adapter and a USB-to-DB-9 plug adapter. You must provide the USB-to-DB-9 plug adapter.



**Table 102: Console Port Connector Pinout Information**

Pin	Signal	Description
1	NC	No connect
2	NC	No connect
3	TxD Output	Transmit data
4	GND	Signal ground
5	GND	Signal ground
6	RxD Input	Receive data
7	DCD Input	Data carrier detect
8	NC	No connect

## USB Port Specifications for an EX Series Switch

Juniper Networks tested and officially supports the following USB flash drives for the USB port on all EX Series switches:

- RE-USB-1G-S
- RE-USB-2G-S
- RE-USB-4G-S



**CAUTION:** Any USB memory product not listed as supported for EX Series switches has not been tested by Juniper Networks. The use of any unsupported USB memory product could expose your EX Series switch to unpredictable behavior. Juniper Networks Technical Assistance Center (JTAC) can provide only limited support for issues related to

unsupported hardware. We strongly recommend that you use only supported USB flash drives.

All USB flash drives used on EX Series switches must have the following features:

- USB 2.0 or later.
- Formatted with a FAT32 or MS-DOS file system.
- If the switch is running Junos OS Release 9.5 or earlier, the formatting method must use a primary boot record. Microsoft Windows formatting, by default, does not use a primary boot record. See the documentation for your USB flash drive for information about how your USB flash drive is formatted.

## RJ-45 Management Port Connector Pinout Information

[Table 103 on page 165](#) provides the pinout information for the RJ-45 connector for the management port on Juniper Networks devices.

**Table 103: RJ-45 Management Port Connector Pinout Information**

Pin	Signal	Description
1	TRP1+	Transmit/receive data pair 1
2	TRP1-	Transmit/receive data pair 1
3	TRP2+	Transmit/receive data pair 2
4	TRP3+	Transmit/receive data pair 3
5	TRP3-	Transmit/receive data pair 3
6	TRP2-	Transmit/receive data pair 2
7	TRP4+	Transmit/receive data pair 4

**Table 103: RJ-45 Management Port Connector Pinout Information (Continued)**

Pin	Signal	Description
8	TRP4-	Transmit/receive data pair 4

## RJ-45 to DB-9 Serial Port Adapter Pinout Information

The console port on a Juniper Networks device is an RS-232 serial interface that uses an RJ-45 connector to connect to a management device such as a laptop or a desktop PC. If your laptop or desktop PC does not have a DB-9 plug connector pin and you want to connect your laptop or desktop PC to the device, use a combination of the RJ-45 to DB-9 socket adapter along with a USB to DB-9 plug adapter.

[Table 104 on page 166](#) provides the pinout information for the RJ-45 to DB-9 serial port adapter.

**Table 104: RJ-45 to DB-9 Serial Port Adapter Pinout Information**

RJ-45 pin	Signal	DB-9 pin	Signal
1	NC	8	CTS
2	NC	6	DSR
3	TxD	2	RxD
4	GND	5	GND
6	RxD	3	TxD
7	DCD	4	DTR
8	NC	7	RTS

# 4

CHAPTER

## Installation and Configuration

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### IN THIS CHAPTER

- Install the EX4400 Switch | **168**
  - How to Install an ORv3-Compliant Switch with Tray Assembly (1 OU) in Your ORv3 Rack | **187**
  - Connect the EX4400 to Power | **196**
  - Connect the EX4400 to External Devices | **207**
  - Register Products—Mandatory to Validate SLAs | **211**
  - Connect the EX4400 to the Network | **211**
  - Configure Junos OS on the EX4400 | **217**
-

# Install the EX4400 Switch

## SUMMARY

This topic guides you through the steps to install EX4400 switches on two post racks, four-post racks, desks, and walls.

## IN THIS SECTION

- [Unpack an EX4400 Switch | 168](#)
- [Packing List for an EX4400 Switch | 169](#)
- [Update Base Installation Data | 170](#)
- [Mount an EX4400 Switch on Two Posts of a Rack | 171](#)
- [Mount an EX4400 Switch Flush with the Front Posts of a Four-Post Rack or Cabinet | 174](#)
- [Mount an EX4400 Switch in a Recessed Position in a Rack or Cabinet | 177](#)
- [Mount an EX4400 Switch on a Desk or Other Level Surface | 181](#)
- [Mount an EX4400 Switch on a Wall | 182](#)

## Unpack an EX4400 Switch

We ship EX4400 switches in a cardboard carton, secured with foam packing material. The carton has an accessory compartment.



**CAUTION:** EX4400 switches are maximally protected inside the shipping carton. Do not unpack the switches until you are ready to mount the switch.

To unpack the switch:

1. Move the shipping carton to a staging area as close to the installation site as possible, but where you have enough room to remove the system components.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Pull out the packing material holding the switch in place.

5. Verify the parts received against the inventory on the label attached to the carton (see "[Packing List for an EX4400 Switch](#)" on page 169).
6. Save the shipping carton and packing materials in case you need to move or ship the switch later.

## Packing List for an EX4400 Switch

The switch shipment includes a packing list. Check the parts you receive with the switch against the items on the packing list. The parts shipped depend on the switch model you purchase (see "[EX4400 Models and Specifications](#)" on page 17).

If any part on the packing list is missing, contact your customer service representative or contact Juniper customer care from within the U.S. or Canada by telephone at 1-888-314-5822. For international-dial or direct-dial options in countries without toll-free numbers, see <https://www.juniper.net/support/requesting-support.html>.

[Table 105 on page 169](#) lists the parts and their quantities as listed in the standard packing list for an EX4400 switch.

**Table 105: Inventory of Components Provided with an EX4400 Switch**

Component	Quantity
Switch	1
Fan modules	2 preinstalled
Power supply	1 (AC or DC) preinstalled
(If you purchased a model with an AC power supply) AC power cord appropriate for your geographical location	1
(If you purchased a model with an AC power supply) AC power cord retainer	1
DC power source cord with a connector (CBL-JNP-PWR-DSUB)—provided along with DC SKU's	1

Table 105: Inventory of Components Provided with an EX4400 Switch (*Continued*)

Component	Quantity
Covers for slots without preinstalled components	<ul style="list-style-type: none"> <li>• Extension module slot cover panel: 1</li> <li>• Power supply slot cover panel: 1</li> </ul>
Two-post mounting brackets	2
Screws to attach the mounting brackets	8
Rubber feet to mount the switch on a desktop or other level surface	4
Documentation Roadmap	1
Juniper Networks Product Warranty	1
End User License Agreement	1

## Update Base Installation Data



**CAUTION:** Update the installation base data if any addition or change to the installation base occurs or if the installation base is moved. Juniper Networks is not responsible for not meeting the hardware replacement SLA for products that do not have accurate installation base data.

Update your installation base at <https://supportportal.juniper.net/s/CreateCase> .

## Mount an EX4400 Switch on Two Posts of a Rack

You can mount an EX4400 switch on a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting kit (part number: EX-RMK) provided with the switch. (The remainder of this topic uses *rack* to mean rack or cabinet.)

Before you mount an EX4400 switch on two posts of a rack:

- Verify that the site meets the requirements described in ["Site Preparation Checklist for EX4400 Switches" on page 141](#).
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.
- Read [Juniper Networks Safety Guide](#), with particular attention to [Chassis and Component Lifting Guidelines](#).
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [Prevention of Electrostatic Discharge Damage](#)).
- Remove the switch from the shipping carton (see ["Unpack an EX4400 Switch" on page 168](#)).

Ensure that you have the following parts and tools available:

- Number 2 Phillips (+) screwdriver—not provided
- Four screws to secure the mounting brackets to the rack—not provided
- An ESD grounding strap—not provided
- The two-post mounting kit that includes two mounting brackets and eight screws to attach the mounting brackets—provided with the switch
- Covers for the empty extension module slot and the empty power supply slot—provided with the switch

You can also mount an EX4400 switch:

- Flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit.
- In a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit.
- On a desk or other level surface by using the rubber feet provided with the switch.
- On a wall by using a separately orderable wall mount kit.



To know the part numbers for ordering the separately orderable mounting kits, see the [EX4400 Switches Datasheet](#).



**NOTE:** One person must be available to lift the switch while another person secures the switch to the rack.



**CAUTION:** If you are mounting multiple units on a rack, mount the heaviest unit at the bottom of the rack, and then mount the other units from the bottom of the rack to the top in decreasing order of the weight of the units.

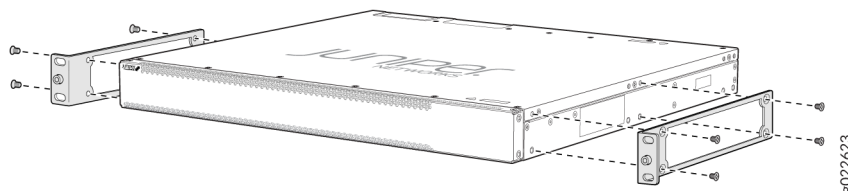
To mount an EX4400 switch on two posts of a rack:

1. Place the switch on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Attach the two-post mounting brackets (provided with the switch) to the side panels of the switch chassis by using the screws to attach the brackets (provided with the switch).

To mount the switch flush with the posts:

- a. Align the L-shaped (front) end of the mounting brackets flush with the front panel of the switch chassis.
- b. Insert the screws into the aligned holes on the chassis (see [Figure 95 on page 172](#)). Tighten the screws.

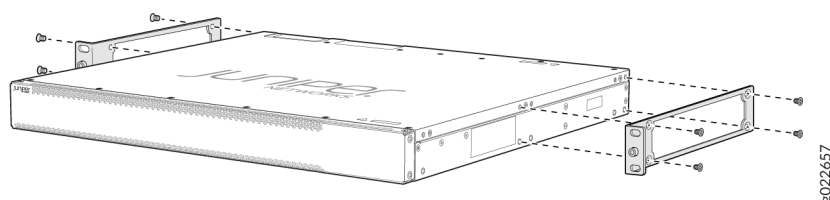
**Figure 95: Attach the Two-Post Mounting Brackets Flush with the Front Panel of the Switch**



To mount the switch along the middle of its side panels:

- a. Align the L-shaped (front) end of the mounting brackets along the middle of the side panels.
- b. Insert the screws into the aligned holes on the chassis (see [Figure 96 on page 173](#)). Tighten the screws.

Figure 96: Attach the Two-Post Mounting Brackets Center Aligned to the Side Panels



4. Decide which end of the switch you want to place at the front of the rack. Position the switch so that the **AIR IN** labels on the fan modules are next to the cold aisle and the **AIR OUT** labels on the fan modules are next to the hot aisle.
5. Have one person grasp both sides of the switch, lift the switch, and position it in the rack, aligning the holes of the mounting brackets with the threaded holes in the front post of the rack. Align the bottom hole in both the mounting brackets with a hole in each rack rail, making sure that the chassis is level.
6. Have a second person secure the mounting brackets to the rack by using four screws appropriate for your rack. Tighten the screws (see [Figure 97 on page 173](#) or [Figure 98 on page 173](#)).

Figure 97: Secure the Switch Flush with the Posts of the Rack

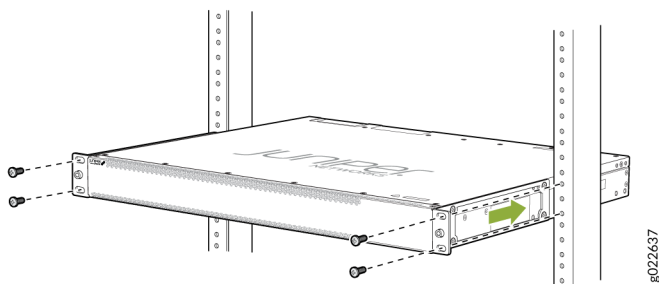
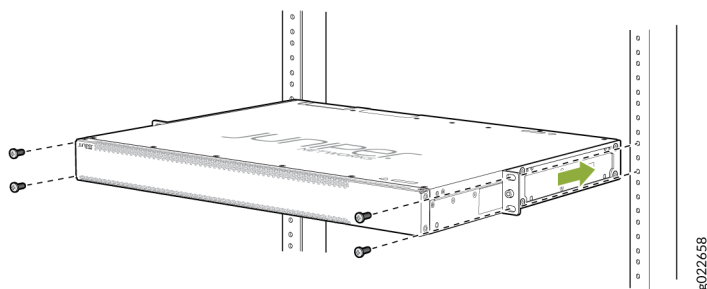


Figure 98: Secure the Switch to the Rack Center Aligned to the Side Panels



7. Ensure that the switch chassis is level by verifying that all screws on one side of the rack align with the screws on the other side.
8. Cover the empty extension module slot and empty power supply slot by using the covers that came with the switch.



**NOTE:** The slot covers reduce the risk of objects or substances entering the chassis. They also ensure optimal cooling for the switch.

## Mount an EX4400 Switch Flush with the Front Posts of a Four-Post Rack or Cabinet

You can mount an EX4400 switch flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit (part number: EX-4PST-RMK). (The remainder of this topic uses *rack* to mean rack or cabinet.)

Before you mount an EX4400 switch flush with the front posts of a 19-in. four-post rack:

- Verify that the site meets the requirements described in ["Site Preparation Checklist for EX4400 Switches" on page 141](#).
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.
- Read [Juniper Networks Safety Guide](#), with particular attention to [Chassis and Component Lifting Guidelines](#).
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [Prevention of Electrostatic Discharge Damage](#)).
- Remove the switch from the shipping carton (see ["Unpack an EX4400 Switch" on page 168](#)).

Ensure that you have the following parts and tools available:

- Number 2 Phillips (+) screwdriver—not provided
- Eight screws to secure the mounting brackets to the rack—not provided
- An ESD grounding strap—not provided
- Front mounting bracket assembly to mount the switch flush with the front posts of a rack—2 (provided with the four-post rack mount kit)

The front mounting bracket assembly is made up of a side rail to which an L-shaped bracket is attached.

- Flat head 4x6-mm Phillips screws to attach the front mounting bracket assembly to the chassis—12 (provided with the four-post rack mount kit)
- Rear mounting brackets—2 (provided with the four-post rack mount kit)
- Covers for the empty extension module slot and the empty power supply slot—provided with the switch

You can also mount an EX4400 switch:

- In a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit.
- On a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting brackets and screws provided with the switch.
- On a desk or other level surface by using the rubber feet provided with the switch.
- On a wall by using a separately orderable wall mount kit.

To know the part numbers for ordering the separately orderable mounting kits, see the [EX4400 Switches Datasheet](#).



**NOTE:** One person must be available to lift the switch while another person secures the switch to the rack.

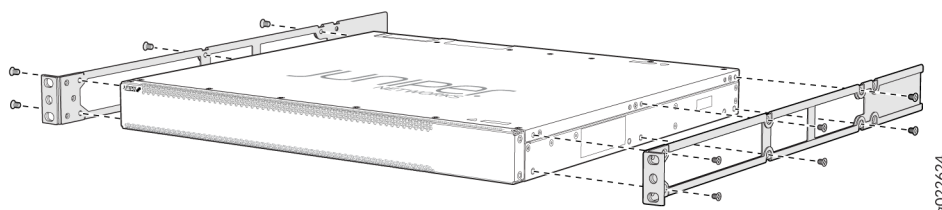


**CAUTION:** If you are mounting multiple units on a rack, mount the heaviest unit at the bottom of the rack, and then mount the other units from the bottom of the rack to the top in decreasing order of the weight of the units.

To mount an EX4400 switch flush with the front posts of a 19-in. four-post rack:

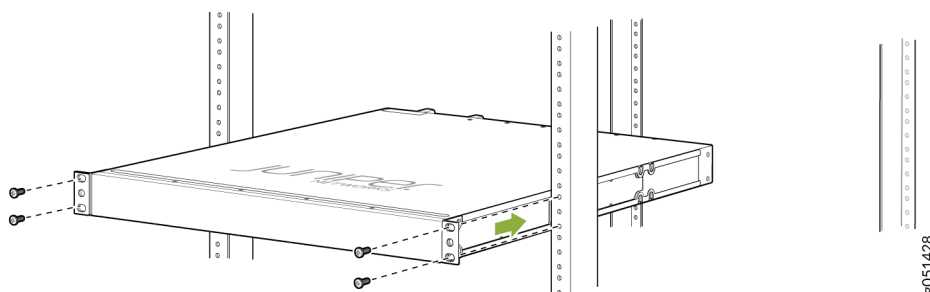
1. Place the switch on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Align the front mounting bracket assembly (provided with the four-post rack mount kit) along the side panel of the switch such that the front of the bracket assembly is flush with the front panel of the switch chassis.
4. Insert the flat head 4x6-mm Phillips screws to attach the front mounting bracket assembly (provided with the four-post rack mount kit) into the aligned holes on the chassis (see [Figure 99 on page 176](#)). Tighten the screws.

**Figure 99: Attach the Flush Mounting Bracket Assembly to the Switch**



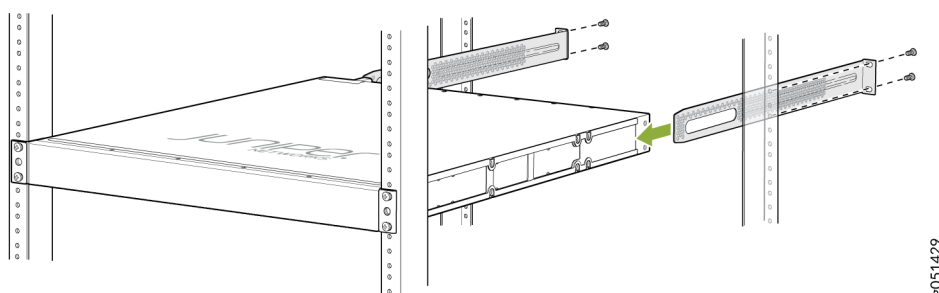
5. Decide which end of the switch you want to place at the front of the rack. Position the switch so that the **AIR IN** labels on the fan modules are next to the cold aisle and the **AIR OUT** labels on the fan modules are next to the hot aisle.
6. Have one person grasp both sides of the switch, lift the switch, and position it in the rack, aligning the holes of the mounting brackets with the threaded holes in the front post of the rack. Align the bottom hole in both the mounting brackets with a hole in each rack rail, making sure that the chassis is level.
7. Have a second person secure the mounting brackets to the rack by using the screws appropriate for your rack. Tighten the screws (see [Figure 100 on page 176](#)).

**Figure 100: Secure the Switch to the Front Posts of a Rack**



8. Slide the rear mounting bracket blades into the side rails of the front mounting bracket assembly attached to the switch chassis (see [Figure 101 on page 177](#)).
9. Ensure that the chassis is level. Align the holes of the rear mounting brackets with the threaded holes in the rear post of the rack. Align the bottom hole in both the mounting brackets with a hole in each rack rail. Align the bottom hole in both the rear mounting brackets with the bottom hole in the front mounting brackets.
10. Secure the rear mounting brackets to the rear post of the rack by using four screws appropriate for your rack (see [Figure 101 on page 177](#)).

**Figure 101: Secure the Switch to the Rear Post of the Rack by Using the Rear Mounting Brackets**



11. Cover the empty extension module slot and empty power supply slot by using the covers that came with the switch.



**NOTE:** The slot covers reduce the risk of objects or substances entering the chassis. They also ensure optimal cooling for the switch.

## Mount an EX4400 Switch in a Recessed Position in a Rack or Cabinet

You can mount an EX4400 switch in a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit (part number: EX-4PST-RMK). (The remainder of this topic uses *rack* to mean rack or cabinet.)

Before you mount an EX4400 switch in a recessed position inside a 19-in. four-post rack:

- Verify that the site meets the requirements described in ["Site Preparation Checklist for EX4400 Switches" on page 141](#).
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.
- Read [Juniper Networks Safety Guide](#), with particular attention to [Chassis and Component Lifting Guidelines](#).
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [Prevention of Electrostatic Discharge Damage](#)).
- Remove the switch from the shipping carton (see ["Unpack an EX4400 Switch" on page 168](#)).

Ensure that you have the following parts and tools available:

- Number 2 Phillips (+) screwdriver—not provided

- Eight screws to secure the mounting brackets to the rack—not provided
- An ESD grounding strap—not provided
- Front mounting bracket assembly to mount the switch flush with the front posts of a rack—2 (provided with the four-post rack mount kit)

The front mounting bracket assembly is made up of a side rail to which an L-shaped bracket is attached.

- Flat head 4x6-mm Phillips screws to attach the front mounting bracket assembly to the chassis—12 (provided with the four-post rack mount kit)
- Rear mounting brackets with blades—2 (provided with the four-post rack mount kit)
- Recessed-mounting brackets to mount the switch in a recessed position from the front posts of a rack—2 (provided with the four-post rack mount kit)
- Flat head 4-40 Phillips screws to attach the recessed-mounting brackets to the side rails of the bracket assembly—6 (provided with the four-post rack mount kit)
- Covers for the empty extension module slot and the empty power supply slot—provided with the switch

You can also mount an EX4400 switch:

- Flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit.
- On a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting brackets and screws provided with the switch.
- On a desk or other level surface by using the rubber feet provided with the switch.
- On a wall by using a separately orderable wall mount kit.

To know the part numbers for ordering the separately orderable mounting kits, see the [EX4400 Switches Datasheet](#).



**NOTE:** One person must be available to lift the switch while another person secures the switch to the rack.

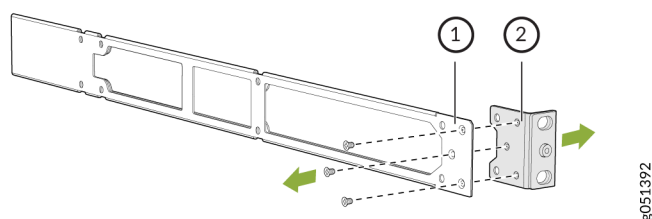


**CAUTION:** If you are mounting multiple units on a rack, mount the heaviest unit at the bottom of the rack, and then mount the other units from the bottom of the rack to the top in decreasing order of the weight of the units.

To mount an EX4400 switch in a recessed position from the front posts of a 19-in. four-post rack:

1. Place the switch on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Unscrew and detach the L-shaped bracket from the side rail in the front mounting bracket assembly provided with the four-post rack mount kit (see [Figure 102 on page 179](#)).

**Figure 102: Unscrew and Detach the L-Shaped Bracket from the Side Rail**

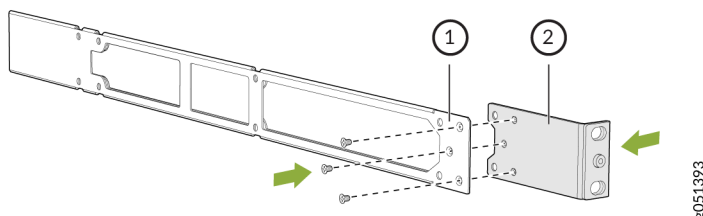


1– Side rail

2– L-shaped bracket

4. Attach the recessed-mounting brackets provided with the four-post rack mount kit to the side rails by using the flat head 4-40 Phillips screws provided with the four-post rack mount kit (see [Figure 103 on page 179](#)).

**Figure 103: Attach the Recessed-Mounting Bracket to the Side Rail**



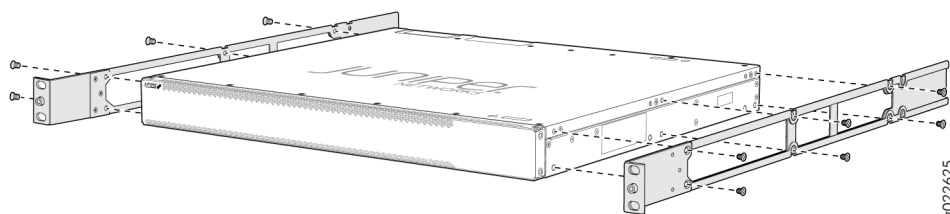
1– Side rail

2– Recessed mounting bracket

5. Align the recessed-mounting bracket assembly along the side panel of the switch.
6. Insert the flat head 4x6-mm Phillips screws to attach the recessed-mounting bracket assembly into the aligned holes on the chassis provided with the four-post rack mount kit (see [Figure 104 on page 180](#)). Tighten the screws.

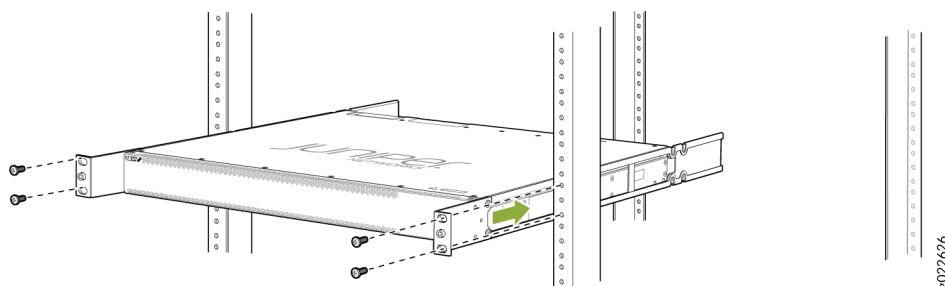


**Figure 104: Attach the Recessed-Mounting Bracket Assembly to the Switch**



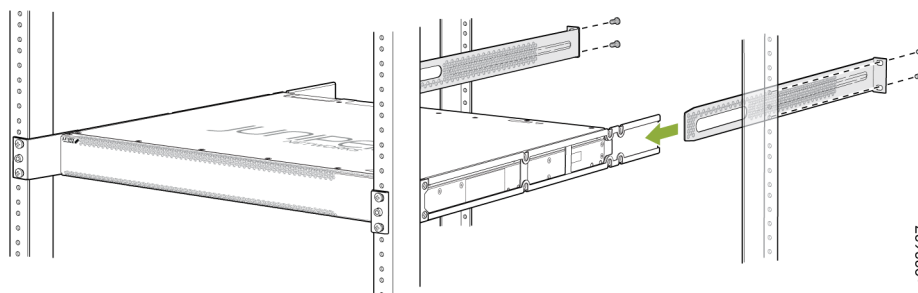
7. Decide which end of the switch you want to place at the front of the rack. Position the switch so that the **AIR IN** labels on the fan modules are next to the cold aisle and the **AIR OUT** labels on the fan modules are next to the hot aisle.
8. Have one person grasp both sides of the switch, lift the switch, and position it in the rack, aligning the holes of the mounting brackets with the threaded holes in the front post of the rack. Align the bottom hole in both the mounting brackets with a hole in each rack rail, making sure that the chassis is level.
9. Have a second person secure the mounting brackets to the rack by using four screws appropriate for your rack. Tighten the screws (see [Figure 105 on page 180](#)).

**Figure 105: Secure the Switch to the Front Posts of a Rack**



10. Slide the rear mounting bracket blades into the side rails of the recessed-mounting bracket assembly attached to the switch chassis (see [Figure 106 on page 181](#)).
11. Ensure that the chassis is level. Align the holes of the rear mounting brackets with the threaded holes in the rear post of the rack. Align the bottom hole in both the mounting brackets with a hole in each rack rail. Align the bottom hole in both the rear mounting brackets with the bottom hole in the front mounting brackets.
12. Secure the rear mounting brackets to the rear post of the rack by using four screws appropriate for your rack (see [Figure 106 on page 181](#)).

**Figure 106: Secure the Switch to the Rear Post of the Rack by Using the Rear Mounting Brackets**



13. Cover the empty extension module slot and empty power supply slot by using the covers that came with the switch.



**NOTE:** The slot covers reduce the risk of objects or substances entering the chassis. They also ensure optimal cooling for the switch.

## Mount an EX4400 Switch on a Desk or Other Level Surface

You can mount an EX4400 switch on a desk or other level surface by using the four rubber feet that are provided with the switch. The rubber feet stabilize the chassis.

Before you mount an EX4400 switch on a desk or other level surface:

- Verify that the site meets the requirements described in ["Site Preparation Checklist for EX4400 Switches" on page 141](#).
- Place the desk in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the desk to the building structure.
- Read [Juniper Networks Safety Guide](#), with particular attention to [Chassis and Component Lifting Guidelines](#).
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [Prevention of Electrostatic Discharge Damage](#)).
- Remove the switch from the shipping carton (see ["Unpack an EX4400 Switch" on page 168](#)).

Ensure that you have the following parts and tools available:

- Four rubber feet to stabilize the chassis on the desk or other level surface—provided with the switch

- Covers for the empty extension module slot and the empty power supply slot—provided with the switch

You can also mount an EX4400 switch:

- Flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit.
- In a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit.
- On a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting brackets provided with the switch.
- On a wall by using a separately orderable wall mount kit.

To know the part numbers for ordering the separately orderable mounting kits, see the [EX4400 Switches Datasheet](#).

To mount the EX4400 on a desk or other level surface:

1. Turn the chassis upside down on the desk or the level surface where you intend to mount the switch.
2. Remove the sticker from the rubber feet.
3. Attach the rubber feet to the bottom of the chassis.
4. Turn the chassis right side up on the desk or the level surface.
5. Cover the empty extension module slot and empty power supply slot by using the covers that came with the switch.



**NOTE:** The slot covers reduce the risk of objects or substances entering the chassis. They also ensure optimal cooling for the switch.

## Mount an EX4400 Switch on a Wall

You can mount an EX4400 switch on a wall by using a separately orderable wall mount kit (part number: EX-WMK). (The remainder of this topic uses *rack* to mean rack or cabinet.)

Before mounting the switch on a wall:

- Verify that the site meets the requirements described in "[Site Preparation Checklist for EX4400 Switches](#)" on page 141.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.

- Read *General Safety Guidelines and Warnings*, with particular attention to *Chassis and Component Lifting Guidelines*.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Remove the switch from the shipping carton (see ["Unpack an EX4400 Switch" on page 168](#)).

Ensure that you have the following parts and tools available:

- Number 2 Phillips (+) screwdriver—not provided
- 8-32 x 1.25 in. or M4 x 30 mm mounting screws— 4 (not provided)
- Hollow wall anchors capable of supporting the combined weight of four fully loaded switches, up to 66 lb (30 kg) (not provided), if you are mounting the switch in sheetrock (wall board with a gypsum plaster core) or in wall board not backed by wall studs.
- Wall mount brackets—2 (provided with the wall mount kit)
- Wall mount bracket screws—12 (provided with the wall mount kit)
- Covers for the empty extension module slot and the empty power supply slot—provided with the switch
- An ESD grounding strap—not provided



**WARNING:** When you are mounting EX4400 switches on a wall, orient the front panel of the chassis pointing to the right side or to the left side to ensure proper airflow and meet safety requirements in the event of a fire.



**NOTE:** For easier lifting, install any additional power supplies only after you mount the switch on the wall.

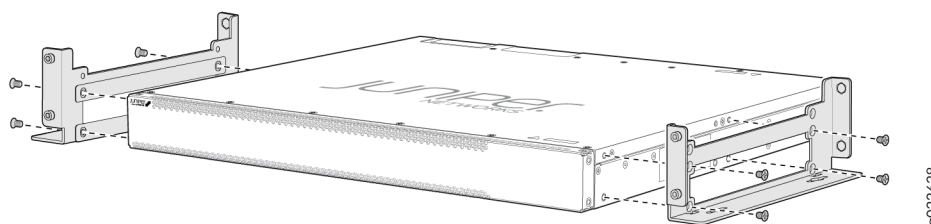
You can also mount an EX4400 switch:

- Flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit.
- In a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit.
- On a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting brackets and screws provided with the switch.
- On a desk or other level surface by using the rubber feet provided with the switch.

To know the part numbers for ordering the separately orderable mounting kits, see the [EX4400 Switches Datasheet](#).

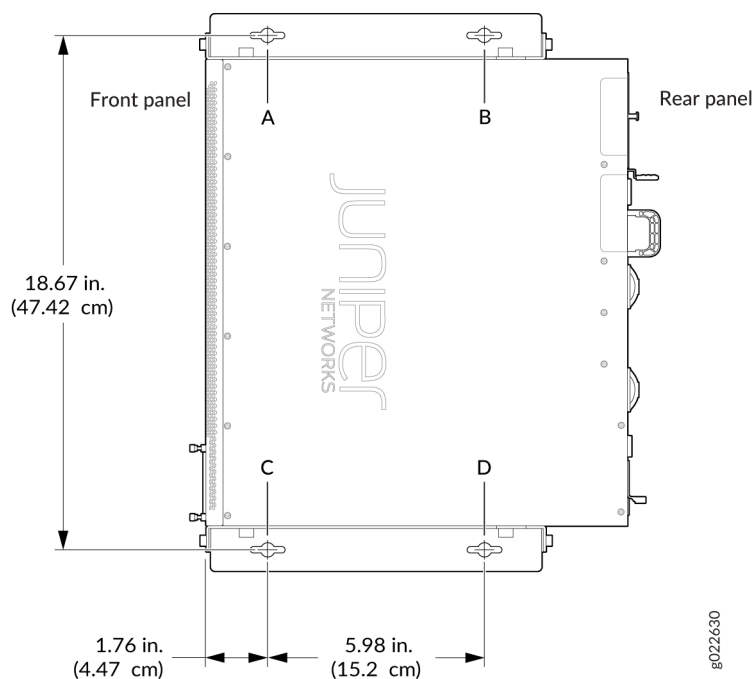
1. Place the switch on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Attach the wall mount brackets to the sides of the chassis by using four of the wall mount bracket screws on each side (see [Figure 107 on page 184](#)). Use the screwdriver to tighten the screws.

**Figure 107: Attach Wall Mount Brackets to the Switch**



4. Insert the four mounting screws in the wall. Insert the top pair of mounting screws 15.2 cm apart, and insert the second pair of mounting screw 47.42 cm directly below the first pair (see [Figure 108 on page 185](#)).

**Figure 108: Measurements for Mounting an EX4400 Switch on a Wall**

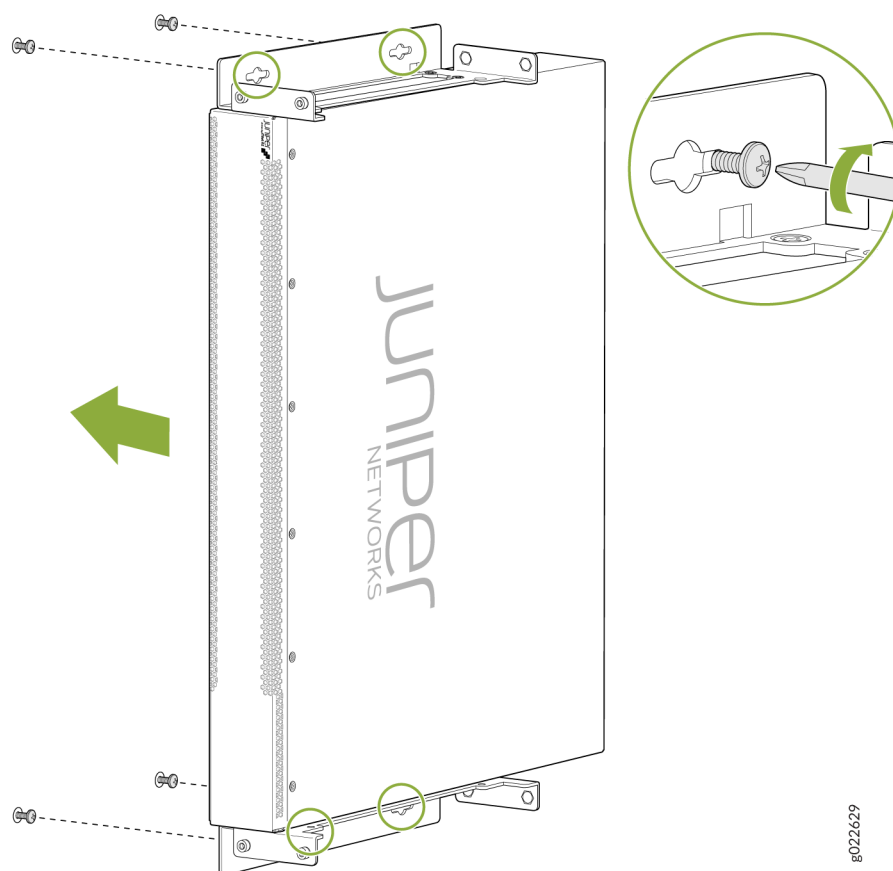


If the mounting screws are inserted in a wall board with no stud behind it, you must use dry wall anchors rated to support 66 lb (30 kg). Insert the screws into wall studs wherever possible to provide added support for the chassis.

Drive the screws only part way in, leaving about 1/4 in. (6 mm) distance between the head of the screw and the wall. Use the screwdriver to drive the screws in.

5. Grasp each side of the switch, lift the switch, and hang the brackets from the mounting screws (see [Figure 109 on page 186](#)).

Figure 109: Mount the Switch on a Wall



6. Tighten the mounting screws by using the screwdriver.
7. Cover the empty extension module slot and empty power supply slot by using the covers that came with the switch.



**NOTE:** The slot covers reduce the risk of objects or substances entering the chassis. The covers also ensure optimal cooling for the switch.

# How to Install an ORv3-Compliant Switch with Tray Assembly (1 OU) in Your ORv3 Rack

## SUMMARY

Use the information in this topic to install the Open Rack V3 (ORv3)-compliant switch with tray assembly in an ORv3 rack.

## IN THIS SECTION

- [Unpack the Switch-Tray Assembly | 187](#)
- [Parts Inventory \(Packing List\) | 188](#)
- [Install the Switch-Tray Assembly in an ORv3 Rack | 189](#)
- [Uninstall the Switch-Tray Assembly from the ORv3 rack | 193](#)
- [Ground the Switch-Tray Assembly | 196](#)

The Open Rack V3 (ORv3)-compliant switch and tray assembly (henceforth referred to as switch-tray assembly) includes a switch preassembled in a tray. This design simplifies and speeds up installation.



**WARNING:** Use this ORv3-compliant tray only with the listed or certified Juniper product. Failure to comply might result in damage.

## Unpack the Switch-Tray Assembly

We ship the switch-tray assembly in a cardboard carton, secured with foam packing material.



**CAUTION:** The switch-tray assembly has maximum protection inside the shipping carton. Do not unpack the switch until you are ready to begin installation.

To unpack the switch-tray assembly:

1. Move the shipping carton to a staging area as close to the installation site as possible. Make sure that you have enough room to remove the system components.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.



4. Remove the accessory box and verify the contents in it against the parts inventory on the label attached to the carton.
5. Pull out the packing material holding the assembly in place.
6. Verify the chassis components received against the packing list included with the switch-tray assembly.
7. Save the shipping carton and packing materials in case you need to move or ship the switch-tray assembly later.

## Parts Inventory (Packing List)

The shipment includes a packing list. Check the parts you receive in the shipping carton against the items on the packing list. We ship the parts according to the configuration that you order.

If any part on the packing list is missing, contact your customer service representative or contact Juniper customer care from within the U.S. or Canada by telephone at 1-888-314-5822. For international-dial or direct-dial options in countries without toll-free numbers, see <https://www.juniper.net/support/requesting-support.html>.

- [Parts List for Switch-Tray Assembly on page 188](#)
- [EX4400 Switch-Tray Assembly: Components and Model Numbers on page 188](#)
- [Parts List for the Accessory Kit on page 189](#)

**Table 106: Parts List for Switch-Tray Assembly**

Component	Quantity	Open Unit (OU)
Preassembled tray with switch (DC switch model)	1	1 OU

**Table 107: EX4400 Switch-Tray Assembly: Components and Model Numbers**

Component Type	Model Number
Preassembled tray with switch (DC switch model)	EX4400-48T-DC-T1
Chassis	EX4400-48T-TS

**Table 107: EX4400 Switch-Tray Assembly: Components and Model Numbers** *(Continued)*

Component Type	Model Number
DC PSU	JPSU-550-DC-AFO
Fan	EX4400-FAN

**Table 108: Parts List for the Accessory Kit**

Component	Quantity
Warranty card	1
End User License Agreement (EULA)	1
Documentation roadmap card	1

## Install the Switch-Tray Assembly in an ORv3 Rack

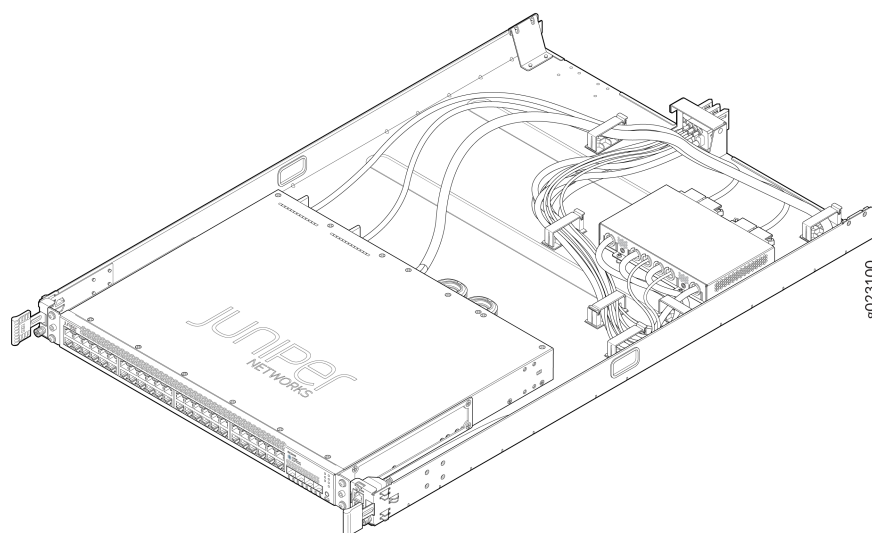
Before installing the switch-tray assembly in an ORv3 rack:

- Verify that the site meets the requirements described in the Site Preparation Checklist of the switch.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read [General Safety Guidelines and Warnings](#), with particular attention to [Chassis and Component Lifting Guidelines](#).

To install the switch-tray assembly in an ORv3 rack:

1. Remove the tray assembly from shipping carton.

Figure 110: Switch-Tray Assembly



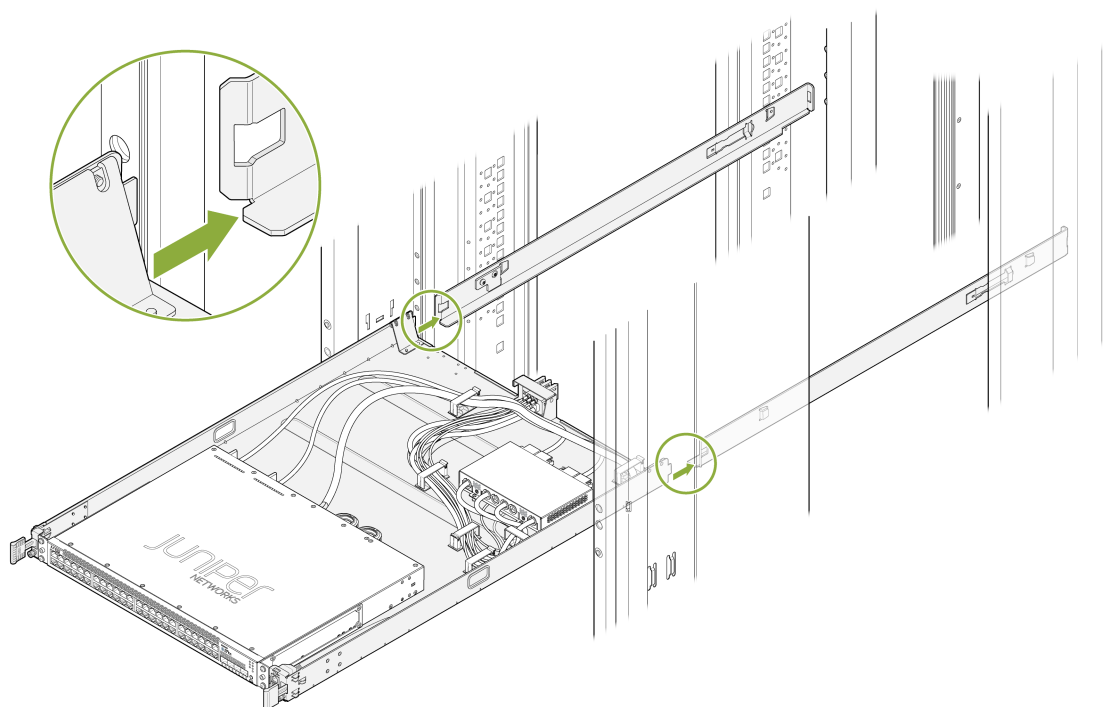
2. Place the switch-tray assembly on a flat, stable surface.
3. Align the rails and secure them in place on your ORv3 rack.



**NOTE:** Rails are not provided with the switch-tray assembly.

4. Carefully align the switch-tray assembly with the rails in the rack.

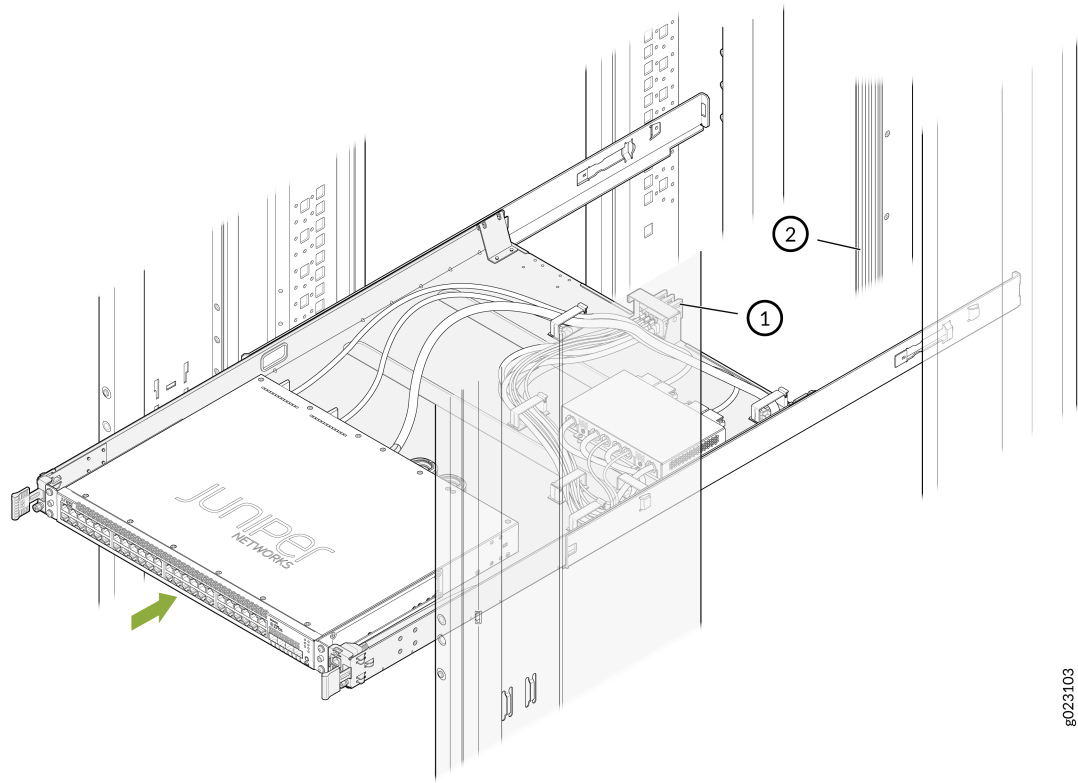
Figure 111: Align the Switch-Tray Assembly with the rails



g023102

5. Slide the switch-tray assembly into the rack until the IT Gear Input Connector at the rear of the switch-tray assembly fully engages with the bus bar.

Figure 112: Slide the Switch-Tray Assembly into the Rack



g023103

Table 109: Component Callouts

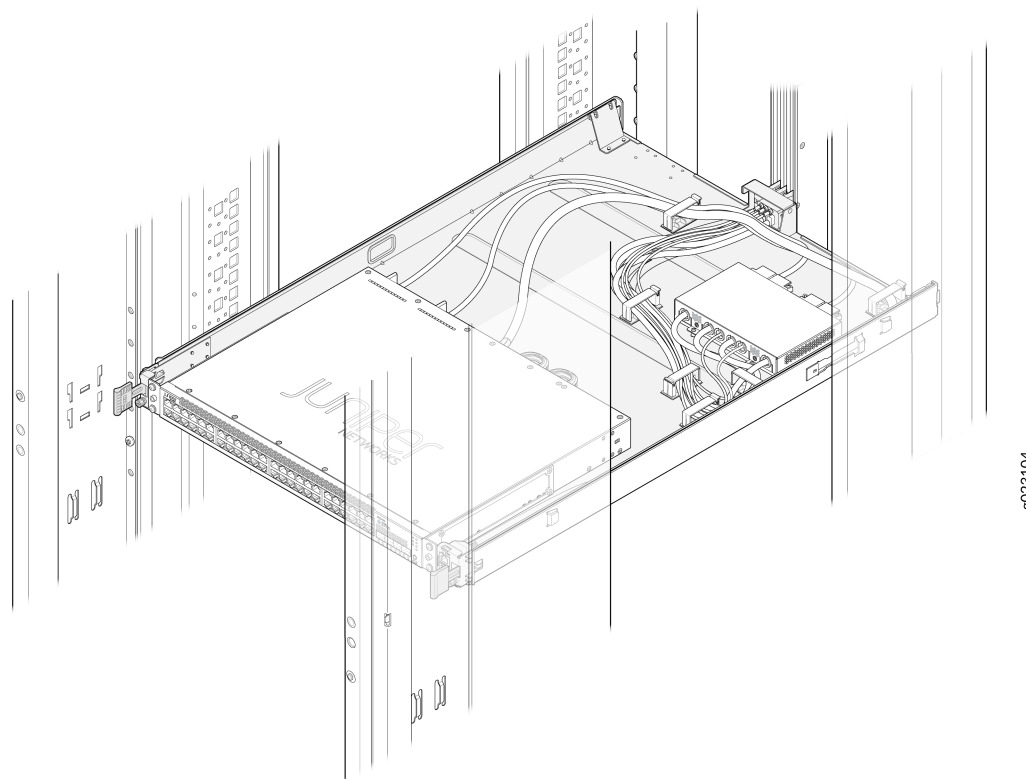
Callout	Description
1	IT Gear Input Connector
2	Bus bar



**NOTE:** The bus bar delivers power to the switch.

When the switch-tray assembly is fully inserted in the rack, the latch locking tabs behind the rack's rail secure the switch-tray assembly in place.

Figure 113: Fully Inserted Switch-Tray Assembly



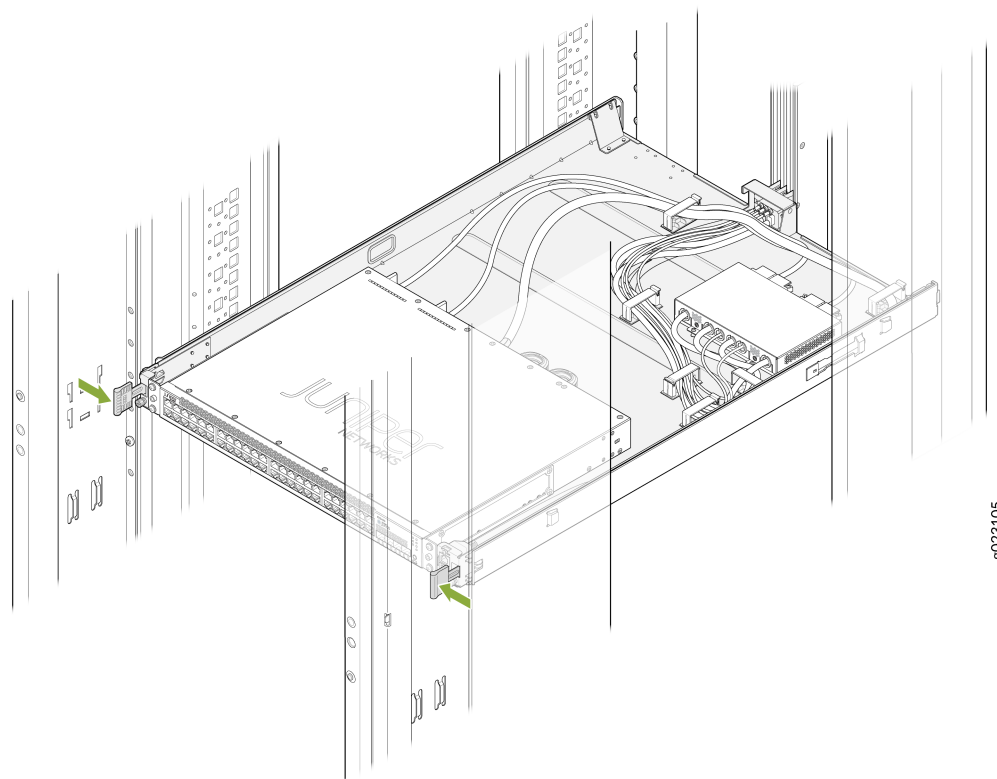
**NOTE:** For the switch-tray assembly installed in an ORv3 rack, you do not require an additional grounding or power configuration. The ORv3 rack infrastructure provides integrated power delivery and grounding. Ensure you install and ground the rack properly according to site standards.

## Uninstall the Switch-Tray Assembly from the ORv3 rack

To uninstall the switch-tray assembly from the ORv3 rack:

1. Locate the latch locking tabs on both sides of the switch-tray assembly.

Figure 114: Locate the Latch Locking Tabs

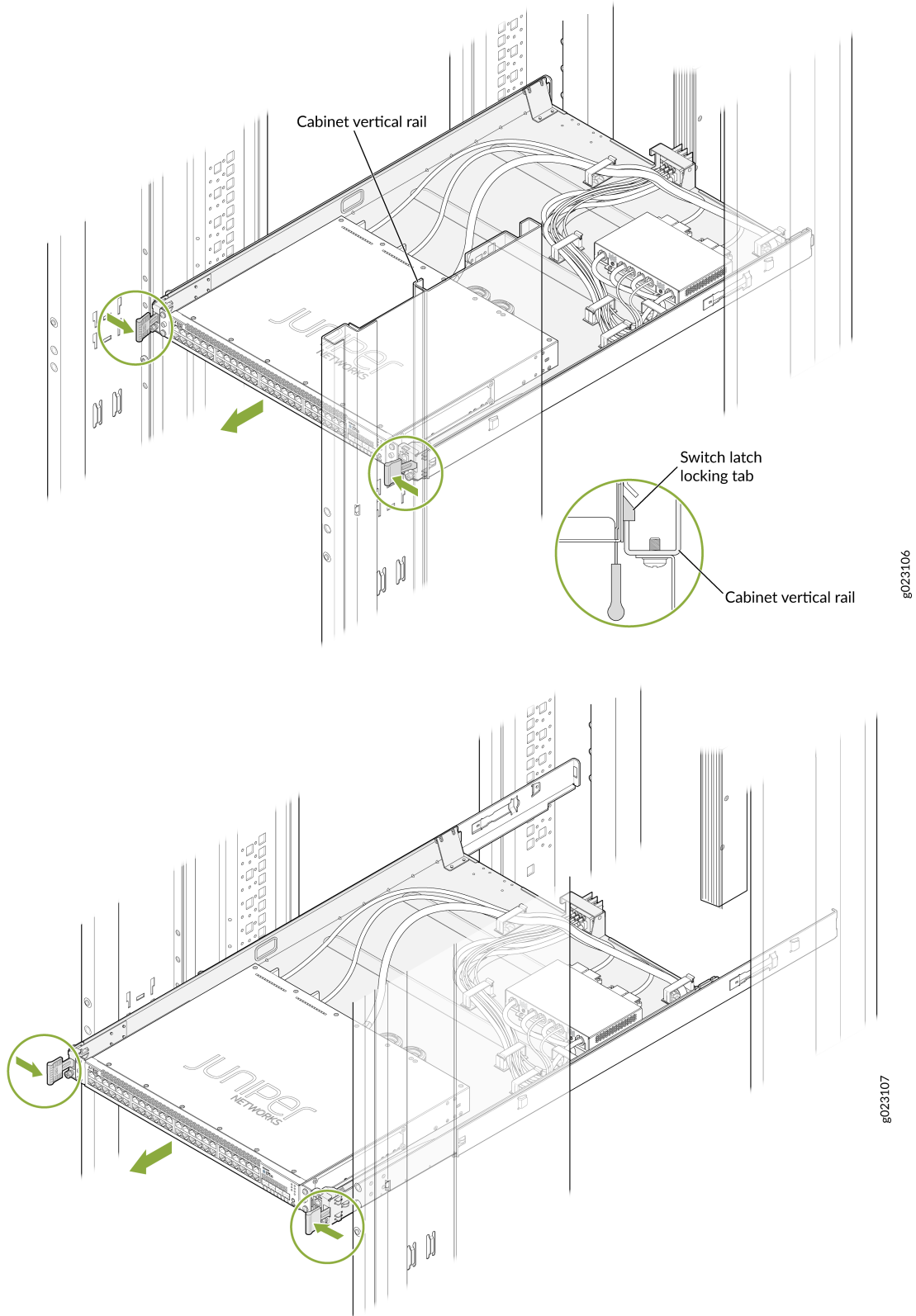


2. Push the latch locking tabs inward on both sides to release the switch-tray assembly from the rack post and gently slide the switch-tray assembly out of the ORv3 rack at same time.



**NOTE:** Do not release the latch locking tabs before pulling the switch-tray assembly out. Both actions must be done simultaneously.

Figure 115: Slide the Switch-Tray Assembly Out





## Ground the Switch-Tray Assembly



**NOTE:** To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the ORv3 rack to the earth ground.

You don't need to make any external connections to ground the switch-tray assembly. The switch-tray assembly is connected to earth ground when you slide in the tray.

The switch-tray assembly gets earth ground protection by virtue of these features:

1. In the switch-tray assembly, the protective earthing terminal of the switch is connected to the tray using a grounding cable terminated with two-hole protective grounding lugs.
2. When the switch-tray assembly is completely inserted into the ORv3 rack, the ground contacts of the IT Gear Input Connector provide an electrically conductive path to the busbar and the rack frame.
3. The rack frame has dedicated grounding points typically located at the top of the rack. These grounding points help ground a loaded ORv3 rack.



**NOTE:** You do not need separate grounding for your switch-tray assembly. The ORv3 rack infrastructure includes built-in grounding. Ensure the rack grounding is implemented according to site requirements. You do not need to take additional action for the switch.

## Connect the EX4400 to Power

### IN THIS SECTION

- [Connect Earth Ground to an EX4400 Switch | 197](#)
- [Connect AC Power to an EX4400 Switch | 198](#)
- [Connect DC Power to an EX4400 Switch | 200](#)
- [Connect Power to an EX4400-48F-S Switch Using the 550-W VDC PSU | 202](#)
- [Connect 2000-W DC Power to an EX4400 Switch | 204](#)

## Connect Earth Ground to an EX4400 Switch

To ensure proper operation and to meet electromagnetic interference (EMI) requirements, you must connect the EX4400 switch to earth ground before you connect power to the switch. You must use the protective earthing terminal on the switch chassis to connect the switch to earth ground (see [Figure 116 on page 198](#)).

You must install the EX4400 switch in a restricted-access location and ensure that the chassis is always properly grounded. EX4400 switches have a 2-hole protective grounding terminal on the rear panel of the chassis. Under all circumstances, use this grounding connection to ground the chassis. For AC-powered systems, you must also use the grounding wire in the AC power cord along with the two-hole grounding lug connection. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.



**CAUTION:** Ensure that a licensed electrician has attached the appropriate grounding lug to the grounding cable that you supply. Using a grounding cable with an incorrectly attached lug can damage the switch.

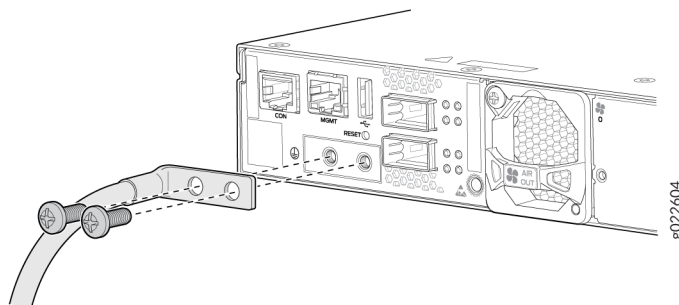
To ground the EX4400 system, you can use either LCD10-10AF-L or LCD8-10AF-L two hole lug to ground the EX4400 switch. Follow these guidelines:

- Use 14 AWG ( 3.3 mm<sup>2</sup>) wire or as per local code if you are using LCD10-10AF-L
- Use 8 AWG (8 mm<sup>2</sup>) wire or as per local code if you are using LCD8-10AF-L.
- Use 6 AWG ( 13.3 mm<sup>2</sup>) wire or as per local code if you are using a LCD6-10AF-L

To ground the EX4400 switch:

1. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.
2. Place the grounding lug attached to the grounding cable over the protective earthing terminal on the rear panel (see [Figure 116 on page 198](#)).

Figure 116: Connect a Grounding Cable to an EX4400 Switch



3. Secure the grounding lug to the protective earthing terminal with the screws.
4. Dress the grounding cable. Be sure that it does not touch or block access to other switch components.



**WARNING:** Ensure that the cable does not drape where people could trip over it.

## Connect AC Power to an EX4400 Switch

Before you connect AC power to the switch:

- Ensure that you have a power cord appropriate for your geographical location available.
- Ensure that you have the power cord retainer shipped with the switch.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have an ESD grounding strap (not provided).
- Ensure that you have connected the switch chassis to earth ground.



**CAUTION:** Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding cable that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit).

To meet electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power (see "[Connect Earth Ground to an EX4400 Switch](#)" on page 197).

- Ensure that you provide an external certified circuit breaker (2-pole circuit breaker based on your device current rating) rated minimum 13 A, 16 A, or 20 A in the building installation or as per local electrical code.

We ship the EX4400 switches with one power supply preinstalled on the rear panel. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running: You can remove and replace either one of them without powering off the switch or disrupting switch functions.

To connect power to an EX4400 switch with an AC power supply:

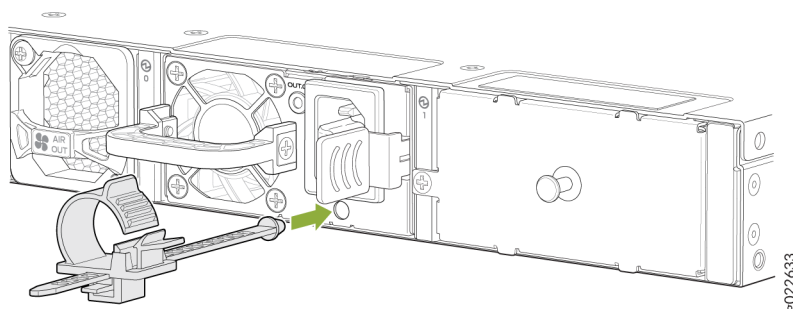
1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Ensure that the power supplies are fully inserted in the chassis.
3. Locate the power cord or cords shipped with the switch; the cords have plugs appropriate for your geographical location.



**WARNING:** Ensure that the power cord does not block access to device components or drape where people can trip on it.

4. Push the end of the retainer strip into the hole below the inlet on the power supply faceplate until it snaps into place. Ensure that the loop in the retainer strip points upward (see [Figure 117 on page 199](#)).

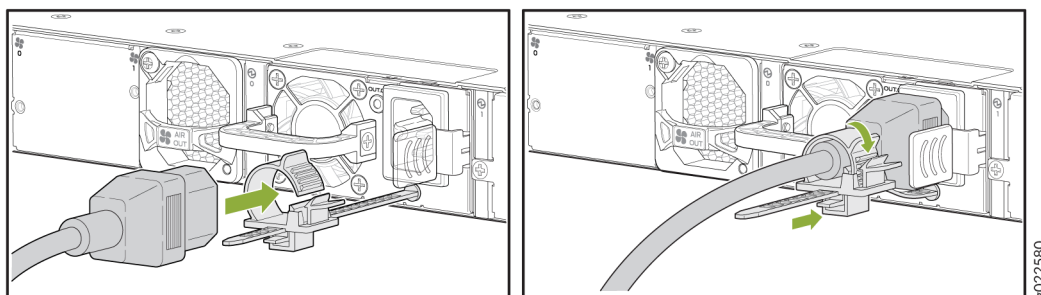
**Figure 117: Connect Retainer Strip**



5. Press the small tab on the retainer strip to loosen the loop. Slide the loop until you have enough space to insert the power cord coupler into the inlet.

6. Insert the power cord coupler firmly into the inlet.
7. Slide the loop toward the power supply until it is snug against the base of the coupler.
8. Press the tab on the loop and draw out the loop into a tight circle (see [Figure 118 on page 200](#)).

**Figure 118: Connect Power to an EX4400 Switch with an AC Power Supply**



9. If the AC power source outlet has a power switch, set it to the off position.
10. Insert the power cord plug into the AC power source outlet. The EX4400 switch powers on as soon as power is provided to the power supply. There is no power switch on the EX4400.
11. If the AC power source outlet has a power switch, set it to the on position.
12. Verify that the **OUT.OK** LED on the power supply is lit steadily green. If it is not, disconnect the power supply from the power source, and replace the power supply (see ["Maintain the EX4400 Power System" on page 239](#)).



**CAUTION:** Do not remove the power supply until you have a replacement power supply ready: you must install the replacement power supply within one minute after removing the failed power supply to ensure proper airflow and prevent chassis overheating.

## Connect DC Power to an EX4400 Switch

Before you connect DC power to the switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have connected the switch chassis to earth ground.



**CAUTION:** Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding cable that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit).

To meet electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power (see ["Connect Earth Ground to an EX4400 Switch" on page 197](#)).

Ensure that you have the following parts and tools available:

- DC power source cord with a connector (CBL-JNP-PWR-DSUB)—provided
- Number 2 Phillips (+) screwdriver—not provided
- An ESD grounding strap—not provided

We ship the EX4400 switches with one power supply preinstalled on the rear panel. You can install up to two power supplies in the switch. You must order the second power supply and a power source cord separately. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running. You can remove and replace either one of the power supplies without powering off the switch or disrupting switch functions.



**NOTE:** You must connect the battery returns of the DC power supply to frame ground.

To connect power to an EX4400 switch with a DC power supply:

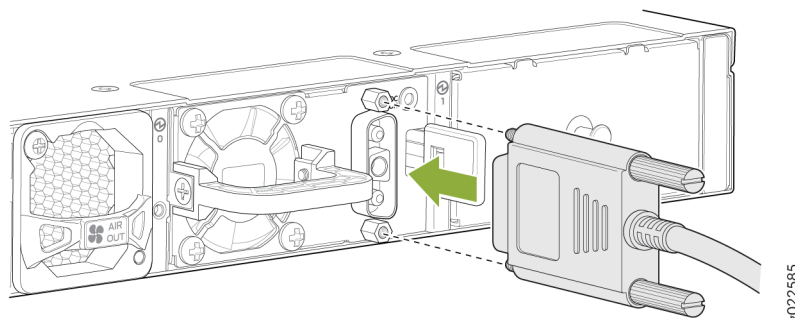
1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.



**CAUTION:** The connection between each power source and power supply must include a circuit breaker.

2. Ensure that the input circuit breaker is open so that the voltage across the DC power source cord leads is 0 V and that the cord leads do not become active while you are connecting DC power.
3. Ensure that the power supplies are fully inserted in the chassis.
4. Insert the power cord coupler firmly into the inlet and tighten the screws on the coupler by using the screwdriver (see [Figure 119 on page 202](#)).

Figure 119: Connect Power to an EX4400 Switch with a DC Power Supply



5. Connect the power cord to the power source. The EX4400 switch powers on as soon as power is provided to the power supply. There is no power switch on the EX4400.

We've designed the EX4400 switch to operate with a DC power supply that has a single, nonredundant feed input. For source redundancy, you must install two DC power supplies in the EX4400; connect one source to one power supply and connect another source to the second power supply. This configuration provides the commonly deployed feed redundancy for the system.

6. Close the input circuit breaker.
7. Verify that the **DC.OK** LED on the power supply is lit steadily green. If it is not, disconnect the power supply from the power source, and replace the power supply (see ["Maintain the EX4400 Power System"](#) on page 239).



**CAUTION:** Do not remove the power supply until you have a replacement power supply ready: you must install the replacement power supply within one minute after removing the failed power supply to ensure proper airflow and prevent chassis overheating.

## Connect Power to an EX4400-48F-S Switch Using the 550-W VDC PSU

Before you connect power to the switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have connected the switch chassis to earth ground.



**CAUTION:** Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding cable that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit).

To meet electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power (see "[Connect Earth Ground to an EX4400 Switch](#)" on page 197).

Ensure that you have the following parts and tools available:

- Power Cord (SAF D-Grid) with a connector—provided
- An ESD grounding strap—not provided

You can install up to two power supplies in the switch. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the other power supply is installed and running. You can remove and replace either one of the power supplies without powering off the switch or disrupting switch functions.



**NOTE:** You must connect the battery returns of the DC power supply to frame ground.

To connect power to an EX4400-48F-S switch with a VDC power supply:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

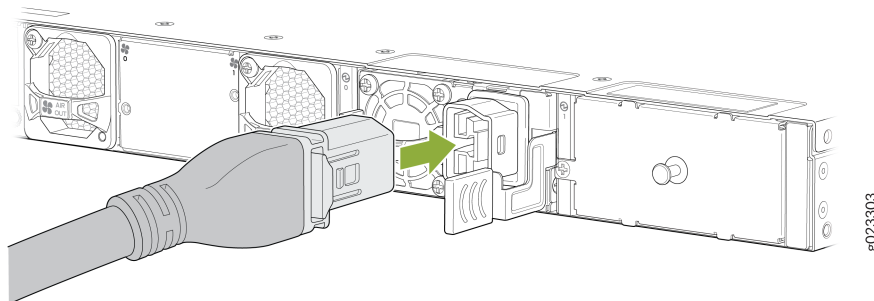


**CAUTION:** The connection between each power source and power supply must include a circuit breaker.

2. Ensure that the input circuit breaker is open so that the voltage across the DC power source cord leads is 0 V and that the cord leads do not become active while you are connecting DC power.
3. Ensure that the power supplies are fully inserted in the chassis.
4. The power cord SAF-D Grid connector has T-Latch Locking mechanism which mates with the SAF-D Grid inlet on PSU. Plug the power cord into the power socket of the PSU. Apply slight pressure so that the power cord is firmly seated in the power socket.



Figure 120: Connect Power to an EX4400 Switch with a VDC Power Supply



5. Connect the power cord to the power source. The EX4400 switch powers on as soon as power is provided to the power supply. There is no power switch on the EX4400.  
We've designed the EX4400 switch to operate with a DC power supply that has a single, non-redundant feed input. For source redundancy, you must install two DC power supplies in the EX4400; connect one source to one power supply and connect another source to the second power supply. This configuration provides the commonly deployed feed redundancy for the system.
6. Close the input circuit breaker.
7. Verify that the **OUT.OK** LED on the power supply is lit steadily green. If it is not, disconnect the power supply from the power source, and replace the power supply (see ["Maintain the EX4400 Power System" on page 239](#)).



**CAUTION:** Do not remove the power supply until you have a replacement power supply ready: you must install the replacement power supply within one minute after removing the failed power supply to ensure proper airflow and prevent chassis overheating.



**NOTE:** To disconnect the power cord, press the latch on the side of the power cable before pulling it out.

## Connect 2000-W DC Power to an EX4400 Switch

You can connect the EX4400-24P, EX4400-24MP, EX4400-48P, EX4400-48MP, EX4400-48XP, and EX4400-48MXP to the 2000-W DC power supply. Before you connect 2000-W DC power to the switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).

- Ensure that you have connected the switch chassis to earth ground.



**CAUTION:** Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding cable that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit).

To meet electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power (see ["Connect Earth Ground to an EX4400 Switch" on page 197](#)).

Ensure that you have the following parts and tools available:

- DC power source cord with a connector (CBL-PWR-2K-DSUB4)—provided
- Number 2 Phillips (+) screwdriver—not provided
- An ESD grounding strap—not provided

You can install up to two power supplies in the switch. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running. You can remove and replace either one of the power supplies without powering off the switch or disrupting switch functions.



**NOTE:** You must connect the battery returns of the DC power supply to frame ground.

To connect power to an EX4400 switch with a 2000-W DC power supply:

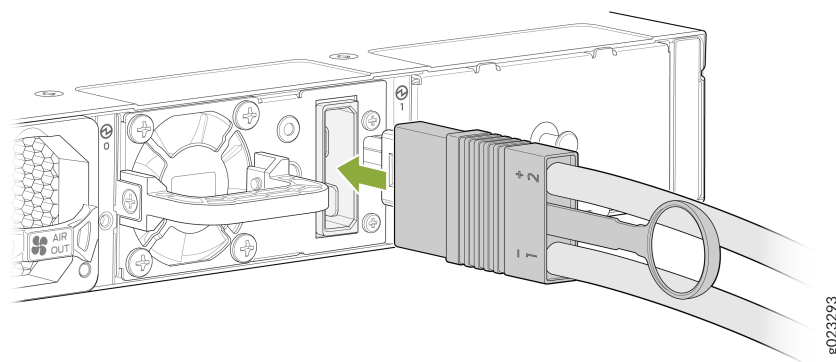
1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.



**CAUTION:** The connection between each power source and power supply must include a circuit breaker. Use 80A(80V) long delay breaker or a circuit breaker as per local electrical code.

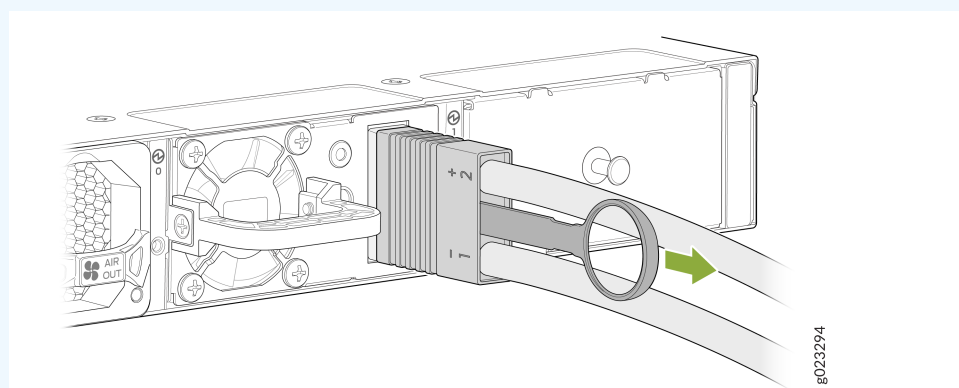
2. Ensure that the input circuit breaker is open so that the voltage across the DC power source cord leads is 0 V and that the cord leads do not become active while you are connecting DC power.
3. Ensure that the power supplies are fully inserted in the chassis.
4. Insert the power cord coupler firmly into the inlet until the coupler snaps and locks into the inlet.

Figure 121: Connect Power to an EX4400 Switch with a 2000-W DC Power Supply



**NOTE:** To remove the power cord coupler from the inlet pull the tab to disengage the snapped and locked coupler from the inlet, and then pull the coupler out; see [Figure 122 on page 206](#).

Figure 122: Disconnect Power to an EX4400 Switch with a 2000-W DC Power Supply



5. Connect the power cord to the power source. The EX4400 switch powers on as soon as power is provided to the power supply. There is no power switch on the EX4400.  
We've designed the EX4400 switch to operate with a DC power supply that has a single, nonredundant feed input. For source redundancy, you must install two DC power supplies in the EX4400; connect one source to one power supply and connect another source to the second power supply. This configuration provides the commonly deployed feed redundancy for the system.
6. Close the input circuit breaker.
7. Verify that the **DC.OK** LED on the power supply is lit steadily green. If it is not, disconnect the power supply from the power source, and replace the power supply (see ["Maintain the EX4400 Power System" on page 239](#)).



**CAUTION:** Do not remove the power supply until you have a replacement power supply ready: you must install the replacement power supply within one minute after removing the failed power supply to ensure proper airflow and prevent chassis overheating.

## Connect the EX4400 to External Devices

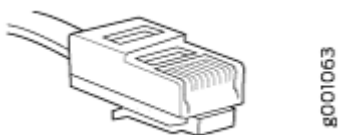
### IN THIS SECTION

- [Connect a Device to a Network for Out-of-Band Management | 207](#)
- [Connect a Device to a Management Console Using an RJ-45 Connector | 208](#)
- [Connect an EX4400 Switch to a Management Console by Using the USB-C Console Port | 210](#)

### Connect a Device to a Network for Out-of-Band Management

Ensure that you have an Ethernet cable that has an RJ-45 connector at either end.

**Figure 123: RJ-45 Connector on an Ethernet Cable**

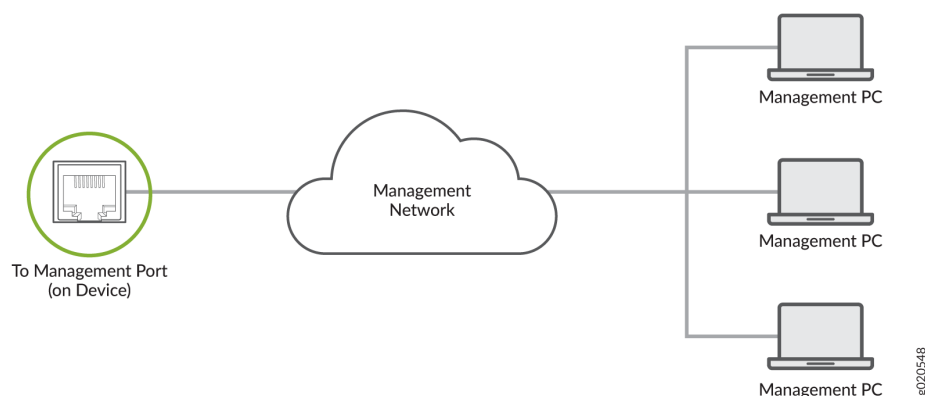


You can monitor and manage a network device, such as a router or a switch, by using a dedicated management channel. Each device has a management port to which you can connect an Ethernet cable with an RJ-45 connector. Use the management port to connect the device to the management device.

To connect a device to a network for out-of-band management:

1. Connect one end of the Ethernet cable to the management port on the device.

2. Connect the other end of the Ethernet cable to the management device.



## Connect a Device to a Management Console Using an RJ-45 Connector

Ensure that you have an Ethernet cable that has an RJ-45 connector at either end and an RJ-45-to-DB-9 serial port adapter.

**Figure 124: RJ-45 Connector on an Ethernet Cable**



**NOTE:** We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device package, or if you need a different type of adapter, you can order the following separately:

- RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
- RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
- RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)

If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter, you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See <https://ftdichip.com/drivers/vcp-drivers/> to download the driver.



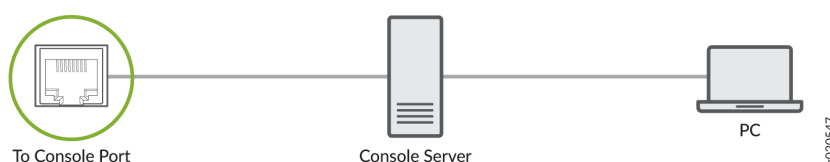
**NOTE:** If your laptop or desktop PC does not have a DB-9 plug connector pin and you want to connect your laptop or desktop PC directly to the device, use a combination of the RJ-45-to-DB-9 socket adapter and a USB-to-DB-9 plug adapter. You must provide the USB-to-DB-9 plug adapter.

You can configure and manage your network devices using a dedicated management channel. Each device has a console port that you can connect to using an Ethernet cable with an RJ-45 connector. Use the console port to connect the device to the console server or management console. The console port accepts a cable that has an RJ-45 connector.

To connect the device to a management console:

1. Connect one end of the Ethernet cable to the console port (labeled **CON**, **CONSOLE**, or **CON1**) on the device.
2. Connect the other end of the Ethernet cable to the console server (see [Figure 125 on page 209](#)) or management console (see [Figure 126 on page 209](#)).

**Figure 125: Connect a Device to a Management Console Through a Console Server**



**Figure 126: Connect a Device Directly to a Management Console**



## Connect an EX4400 Switch to a Management Console by Using the USB-C Console Port

### Before You Begin

Before you connect the switch by using the USB-C console port:

- Ensure that the USB to serial driver is installed on the host machine.
- Ensure that the HyperTerminal properties of the console server or laptop are set as follows:
  - Baud rate—9600
  - Flow control—None
  - Data—8
  - Parity—None
  - Stop bits—1
  - DCD state—Disregard

You will need:

- One USB cable with USB-C connectors at both ends—not provided.
- (If your laptop or desktop PC does not have a USB-C port) One USB-A to USB-C converter cable—not provided.

EX4400 switches have two console ports:

- An RJ-45 console port on the rear panel that accepts a cable with an RJ-45 connector.
- A USB-C console port on the front panel that accepts a USB cable with a USB-C connector.

You can log in to the switch and configure and manage the switch by using either of the console ports. The RJ-45 console port is enabled by default. However, you must configure the USB-C console port before you can use it to connect to the switch.

In this topic, you learn how to connect EX4400 switches to the management console by using the USB-C console port.

To connect the switch to the console by using the USB-C console port:

1. Connect the host machine to the device directly by using the active console port or remotely by using the management interface.
2. Connect one end of the USB cable to the USB-C or USB-A port your PC or laptop.

3. Connect the other end of the USB cable to the USB-C console port on the front panel switch.
4. Use the `set system ports auxiliary type ansi` configuration command to enable logging in to the switch by using the USB-C console port.
5. Use the `request system boot-console auxiliary` command to see the boot logs on the console connected to the USB-C port.

Note that only the Junos OS boot logs will be visible on the USB Type-C console.

6. Reboot the switch. The boot logs and the login prompt appear on the console connected to the USB-C port.

## Register Products—Mandatory to Validate SLAs

Juniper Networks auto registers newly purchased products based on the end customer information provided at the point of sale. Registering products and changes to products activates your hardware replacement service-level agreements (SLAs).



**CAUTION:** Update the installation base data if any installation base data is added or changed or if the installation base is moved. Juniper Networks is not responsible for customers not meeting the hardware replacement service-level agreement (SLA) for products that do not have registered serial numbers or accurate installation base data. To know more about how to register your product and update your installation base, see [Juniper Networks Product Registration and Install Base Management](#).

## Connect the EX4400 to the Network

### IN THIS SECTION

- [Install a Transceiver | 212](#)
- [Install a QSFP28 Transceiver | 215](#)
- [Connect a Fiber-Optic Cable | 217](#)



## Install a Transceiver

Before you install a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [Laser and LED Safety Guidelines and Warnings](#)).

Ensure that you have a rubber safety cap available to cover the transceiver.

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace the transceivers without powering off the device or disrupting the device functions.



**NOTE:** After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.



**NOTE:** We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.



**CAUTION:** The Juniper Networks Technical Assistance Center (JTAC) provides complete support for Juniper-supplied optical modules and cables. However, JTAC does not provide support for third-party optical modules and cables that are not qualified or supplied by Juniper Networks. If you face a problem running a Juniper device that uses third-party optical modules or cables, JTAC may help you diagnose host-related issues if the observed issue is not, in the opinion of JTAC, related to the use of the third-party optical modules or cables. Your JTAC engineer will likely request that you check the third-party optical module or cable and, if required, replace it with an equivalent Juniper-qualified component.

Use of third-party optical modules with high-power consumption (for example, coherent ZR or ZR+) can potentially cause thermal damage to or reduce the lifespan of the host equipment. Any damage to the host equipment due to the use of third-party optical modules or cables is the users' responsibility. Juniper Networks will accept no liability for any damage caused due to such use.

[Figure 127 on page 214](#) shows how to install a QSFP+ transceiver. The procedure is the same for all types of transceivers except the QSFP28 and CFP transceivers.

To install a transceiver:



**CAUTION:** To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point or to the ESD point on the device.
2. Remove the transceiver from its bag.
3. Check to see whether the transceiver is covered with a rubber safety cap. If it is not, cover the transceiver with a rubber safety cap.



**LASER WARNING:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and protects your eyes from accidental exposure to laser light.

4. If the port in which you want to install the transceiver is covered with a dust cover, remove the dust cover and save it in case you need to cover the port later. If you are hot-swapping a transceiver, wait for at least 10 seconds after removing the transceiver from the port before installing a new transceiver.
5. Using both hands, carefully place the transceiver in the empty port. The connectors must face the chassis.



**CAUTION:** Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the transceiver unusable.

6. Slide the transceiver in gently until it is fully seated. If you are installing a CFP transceiver, use your fingers to tighten the captive screws on the transceiver.
7. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.



**LASER WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.



**CAUTION:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and protects your eyes from accidental exposure to laser light.

8. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs toward the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.

**CAUTION:** Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.

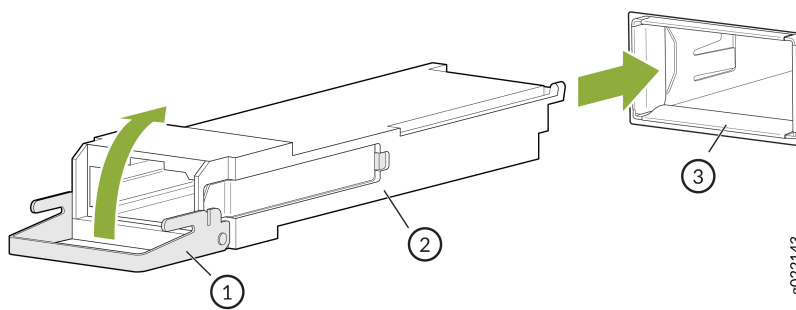
**CAUTION:** Avoid bending the fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

**NOTE:** When you install SFP-DD transceivers, push it hard until you hear a click sound. Use a long nose plier to pull the SFP-DD transceiver connected on the top and bottom rows of the chassis where the pull tabs face each other.

**NOTE:** Make sure to use a dust cap to cover ports that are unused.

**NOTE:** While using Finisar AOC SFP+ optical module with the QFX5130-48C switch, you may need to pull the module upwards to pull out the module smoothly from the cage.

Figure 127: Install a Transceiver



1– Ejector lever

2– Transceiver

3– Port

## Install a QSFP28 Transceiver

Before you install a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings*).

Ensure that you have a rubber safety cap available to cover the transceiver.

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace the transceivers without powering off the device or disrupting the device functions.



**NOTE:** After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.



**NOTE:** We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.



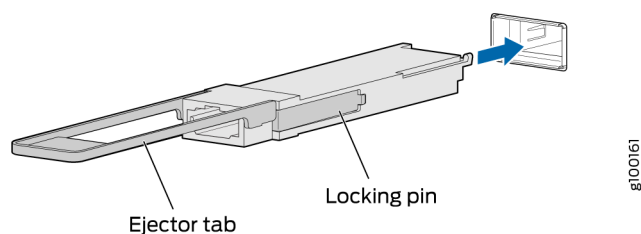
**CAUTION:** The Juniper Networks Technical Assistance Center (JTAC) provides complete support for Juniper-supplied optical modules and cables. However, JTAC does not provide support for third-party optical modules and cables that are not qualified or supplied by Juniper Networks. If you face a problem running a Juniper device that uses third-party optical modules or cables, JTAC may help you diagnose host-related issues if the observed issue is not, in the opinion of JTAC, related to the use of the third-party optical modules or cables. Your JTAC engineer will likely request that you check the third-party optical module or cable and, if required, replace it with an equivalent Juniper-qualified component.

Use of third-party optical modules with high-power consumption (for example, coherent ZR or ZR+) can potentially cause thermal damage to or reduce the lifespan of the host equipment. Any damage to the host equipment due to the use of third-party optical modules or cables is the users' responsibility. Juniper Networks will accept no liability for any damage caused due to such use.

To install a QSFP28 transceiver (see [Figure 128 on page 216](#)):

1. Wrap and fasten one end of an ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the switch.
2. Verify that a rubber safety cap covers the QSFP28 transceiver.
3. Position the transceiver in front of the port on the device so that the QSFP28 connector faces the port.

Figure 128: Install a QSFP28 Transceiver



4. Slide the transceiver into the port until the locking pins lock in place. If there is resistance, remove the transceiver and flip it so that the connector faces the other direction.
5. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.



**LASER WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.



**CAUTION:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and protects your eyes from accidental exposure to laser light.

6. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.



**CAUTION:** Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.



**CAUTION:** Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

## Connect a Fiber-Optic Cable

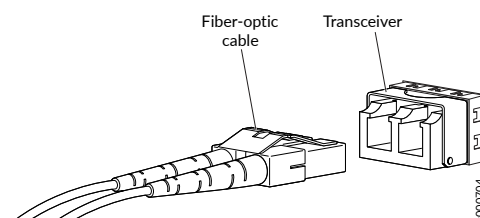
Before you connect a fiber-optic cable to an optical transceiver installed in a device, take the necessary precautions for safe handling of lasers (see [Laser and LED Safety Guidelines and Warnings](#)).

To connect a fiber-optic cable to an optical transceiver installed in a device:



**LASER WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. If the fiber-optic cable connector is covered with a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the optical transceiver. Save the cap.
3. Insert the cable connector into the optical transceiver.



4. Secure the cables so that they do not support their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.



**CAUTION:** Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

## Configure Junos OS on the EX4400

### IN THIS SECTION

- [Connect and Configure an EX4400 Switch by Using the CLI](#) | 218

- [EX4400 Default Configuration | 223](#)
- [Revert an EX4400 Switch to the Factory-Default Configuration | 231](#)

## Connect and Configure an EX4400 Switch by Using the CLI

There are two ways to connect and configure an EX4400 switch: one method is through the console by using the CLI and the other is by using the J-Web interface.

Starting in Junos OS Release 22.3R1, J-Web supports EX4400 switches.

This topic describes the CLI procedure.

Before you connect and configure an EX4400, set the following parameter values on the console server or PC:

- Baud Rate—9600
- Data—8
- Flow Control—None
- Parity—None
- Stop Bits—1
- DCD State—Disregard

Ensure that you have the following parts and tools available:

- An Ethernet cable with an RJ-45 connector attached—not provided
- An RJ-45 to DB-9 serial port adapter—not provided
- A laptop or PC, with a serial port—not provided

Have the following information available before you configure custom settings for the switch:

- Root password
- IP address of the default gateway
- IP address of the management port
- IP address of a DNS server

- (Optional) Hostname
- (Optional) IP address of a backup router
- (Optional) SNMP read community, location, and contact to configure SNMP parameters
- (Optional) Static routes to remote subnets with access to the management port
- (Optional) Static routes to remote prefixes with access to the management port

We ship the EX4400 switch with Junos OS preinstalled and ready to be configured when the switch is powered on. You must perform the initial configuration of the EX4400 through the console port (labeled **CON**) on the rear panel of the switch by using the command-line interface (CLI).

This procedure describes how to perform the initial configuration on the switch and to connect it to the network. For the complete information about enabling the switch to forward traffic, including examples, see the Junos OS configuration guides.

To perform the initial configuration on the switch and to connect it to the network:

1. Power on the switch.
2. Connect the console port (labeled **CON**) to a management host such as a laptop or PC by using an RJ-45 to DB-9 serial port adapter. On EX4400 switch models except EX4400-24X, the console port is on the rear panel. On the EX4400-24X model, the console port is on the front panel.



**NOTE:** We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device package, or if you need a different type of adapter, you can order the following separately:

- RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
- RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
- RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)

If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See, <https://ftdichip.com/drivers/vcp-drivers/> to download the driver.

3. At the Junos OS login prompt, type **root** to log in. You don't need to enter a password. If the software boots before you connect to the console port, you might need to press the Enter key for the prompt to appear.

```
login: root
```



4. Start the CLI.

```
root@RE:0% cli
root>
```

5. Enter configuration mode.

```
root> configure
[edit]
root#
```

6. Add a password to the root administration user account. Enter a plain-text password, an encrypted password, or an SSH public key string.

```
[edit]
root# set system root-authentication plain-text-password
New password: password
Retype new password: password
```

or

```
[edit]
root# set system root-authentication encrypted-password encrypted-password
```

or

```
[edit]
root# set system root-authentication ssh-ecdsa public-key
```

or

```
[edit]
root# set system root-authentication ssh-ed25519 public-key
```

or

```
[edit]
root# set system root-authentication ssh-rsa public-key
```

7. (Optional) Configure the hostname of the switch. If the name includes spaces, enclose the name in double quotation marks (" ").

```
[edit]
root# set system host-name host-name
```

8. (Optional) Create a user account.

```
[edit]
root# set system login user user-name authentication plain-text-password
New password: password
Retype new password: password
```

9. (Optional) Set the user account class to super-user.

```
[edit]
root# set system login user user-name class super-user
```

10. (Optional) Configure the domain name of the switch.

```
[edit]
root# set system domain-name domain-name
```

11. Configure the default gateway.

```
[edit]
root# set routing-options static route 0/0 next-hop address
```

12. Configure the IP address and prefix length for the management interface on the switch.

```
[edit]
root# set interfaces me0 unit 0 family inet address address/prefix-length
```



**NOTE:** The management port `me0` (labeled **MGMT**) is located on the rear panel of the switch.

13. (Optional) Configure the IP address of a backup router, which is used only while the routing protocol is not running.

```
[edit]
root# set system backup-router address
```

14. Configure the IP address of a DNS server.

```
[edit]
root# set system name-server address
```

15. (Optional) Configure the static routes to remote subnets with access to the management port. Access to the management port is limited to the local subnet.

```
[edit]
root# set routing-options static route remote-subnet next-hop destination-IP retain no-
readvertise
```

16. (Optional) Configure the static routes to remote prefixes with access to the management port.

```
[edit]
root# set routing-options static route remote-prefix next-hop destination-IP retain no-
readvertise
```

17. Configure the SSH service.

```
[edit]
root# set system services ssh root-login allow
```

18. Configure in-band management or out-of-band management:

- With in-band management, you can configure a network port interface as the management interface and connect it to the management device. In this scenario, you can do either of the following:
  - Use the automatically created VLAN named *default* for management of all data interfaces as members of the default VLAN. Specify the management IP address and the default gateway.

- Create a new management VLAN. Specify the VLAN name, VLAN ID, management IP address, and default gateway. Select the ports that must be part of this VLAN.
  - With out-of-band management, you use a dedicated management channel to connect to the management device. Specify the IP address and gateway of the management interface. Use this IP address to connect to the switch.
19. (Optional) Specify the SNMP read community, location, and contact to configure SNMP parameters.
  20. (Optional) Specify the system date and time. Select the time zone from the list. The configured parameters are displayed.
  21. Enter **yes** to commit the configuration. The configuration is committed as the active configuration for the switch.
  22. (Optional) Display the configuration to verify that it is correct.
  23. (Optional) Configure additional properties by adding the necessary configuration statements.
  24. Commit the configuration to activate it on the switch.

```
[edit]
root# commit
```

25. When you have finished configuring the switch, exit configuration mode.

```
[edit]
root@switch# exit
root@switch>
```

You can now log in by using the CLI and continue configuring the switch.

To connect and configure an EX4400 switch by using the J-Web interface, see [Connecting and Configuring an EX Series Switch \(J-Web Procedure\)](#).

## EX4400 Default Configuration

Each EX Series switch is programmed with a factory-default configuration that contains the values set for each configuration parameter when the switch is shipped. The default configuration file sets values for system parameters such as syslog and commit, configures Ethernet switching on all interfaces, enables IGMP snooping, and enables the LLDP and RSTP protocols.



### NOTE:

- The factory-default configuration file has more interfaces for models that have more ports.
- The `poe` statement appears only in models with ports that support PoE-bt.

When you commit changes to the configuration, a new configuration file is created, which becomes the active configuration. You can always revert to the factory-default configuration. See *Revert to the Factory-Default Configuration for the EX Series Switch*.

The following is the factory-default configuration file for an EX4400-24P switch with 24 ports that support PoE-bt. The factory-default configuration file for the other EX4400 models is similar.

```
system {
  commit {
    factory-settings {
      reset-chassis-lcd-menu;
      reset-virtual-chassis-configuration;
    }
  }
}
services {
  ssh;
  netconf {
    ssh;
    rfc-compliant;
    yang-compliant;
  }
}
auto-snapshot;
syslog {
  file interactive-commands {
    interactive-commands any;
  }
  file messages {
    any notice;
    authorization info;
  }
}
phone-home {
  server https://redirect.juniper.net;
  rfc-compliant;
}
```

```

    ## Warning: missing mandatory statement(s): 'root-authentication'
}
chassis {
    redundancy {
        graceful-switchover;
    }
}
interfaces {
    ge-0/0/0 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/1 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/2 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/3 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/4 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
}

```

```
ge-0/0/5 {  
    unit 0 {  
        family ethernet-switching {  
            storm-control default;  
        }  
    }  
}  
ge-0/0/6 {  
    unit 0 {  
        family ethernet-switching {  
            storm-control default;  
        }  
    }  
}  
ge-0/0/7 {  
    unit 0 {  
        family ethernet-switching {  
            storm-control default;  
        }  
    }  
}  
ge-0/0/8 {  
    unit 0 {  
        family ethernet-switching {  
            storm-control default;  
        }  
    }  
}  
ge-0/0/9 {  
    unit 0 {  
        family ethernet-switching {  
            storm-control default;  
        }  
    }  
}  
ge-0/0/10 {  
    unit 0 {  
        family ethernet-switching {  
            storm-control default;  
        }  
    }  
}  
ge-0/0/11 {
```

```
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/12 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/13 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/14 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/15 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/16 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/17 {
    unit 0 {
```



```
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/18 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/19 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/20 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/21 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/22 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/23 {
    unit 0 {
        family ethernet-switching {
```

```

        storm-control default;
    }
}
et-0/2/0 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
xe-0/2/0 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
et-0/2/1 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
xe-0/2/1 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
et-0/2/2 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
xe-0/2/2 {
    unit 0 {
        family ethernet-switching {
            storm-control default;

```

```

    }
  }
}
et-0/2/3 {
  unit 0 {
    family ethernet-switching {
      storm-control default;
    }
  }
}
xe-0/2/3 {
  unit 0 {
    family ethernet-switching {
      storm-control default;
    }
  }
}
irb {
  unit 0 {
    family inet {
      dhcp;
    }
  }
}
vme {
  unit 0 {
    family inet {
      dhcp;
    }
  }
}
}
forwarding-options {
  storm-control-profiles default {
    all;
  }
}
protocols {
  lldp {
    interface all;
  }
  lldp-med {
    interface all;
  }
}

```

```

    }
    igmp-snooping {
        vlan default;
    }
    rstp {
        interface all;
    }
}
poe {
    interface all;
}
vllans {
    default {
        vlan-id 1;
        l3-interface irb.0;
    }
}
}

```

## Revert an EX4400 Switch to the Factory-Default Configuration

### IN THIS SECTION

- [Revert to the Factory-Default Configuration by Using the request system zeroize Command | 232](#)
- [Revert to the Factory-Default Configuration by Using the load factory-default Command | 233](#)
- [Revert to the Factory-Default Configuration by Using the Factory Reset/Mode Button | 234](#)

If the current active configuration on your switch fails, you can revert to the factory-default configuration. You can also roll back to a previous configuration, as described in [Rolling Back Junos OS Configuration Changes](#).



**TIP:** If you have lost the root password, it is not necessary to revert to the factory-default configuration to reset it. See [Recovering the Root Password on Switches](#).

The factory-default configuration contains the basic configuration settings for the switch. This is the first configuration of the switch and it is loaded when the switch is first powered on. For the factory-default configuration file for your switch, see the hardware documentation for your switch.



**NOTE:** To revert a member switch of a Virtual Chassis to the factory-default configuration, disconnect the cables connected to the VCPs to avoid affecting Virtual Chassis configuration parameters (member ID, primary-role priority, and setting of VCP uplinks) on other members (see *Disconnect a Fiber-Optic Cable*).

You can revert to the factory-default configuration by using the `request system zeroize operational` command or the `load factory-default configuration` command. You can also use the `load factory-default` command to revert to the factory-default configuration file that contains all default settings *except* the root password setting, which is retained.

We describe these procedures in the following sections:



**NOTE:** After resetting the factory default configuration either through the CLI or Factory Reset/Port mode button, the previous host name of the device is not reset. The host name can only be changed by configuring a new hostname or rebooting the device.

## Revert to the Factory-Default Configuration by Using the `request system zeroize` Command

The `request system zeroize` command is a standard Junos OS operational mode command that removes all configuration information and resets all key values. The operation unlinks all user-created data files, including customized configuration and log files, from their directories. The switch then reboots and reverts to the factory-default configuration.

To completely erase user-created data so that it is unrecoverable, use the `request system zeroize media` command.



**CAUTION:** Before issuing `request system zeroize`, use the `request system snapshot` command to back up the files currently used to run the switch to a secondary device.

1. To revert to the factory-default configuration by using the `request system zeroize` command:

```
user@switch> request system zeroize warning: System will be rebooted and may not boot without
configurationErase all data, including configuration and log files? [yes,no]
(yes)
```

2. Type `yes` to remove configuration and log files and revert to the factory-default configuration.



**NOTE:** The `auto-image-upgrade` statement is added at the `[edit chassis]` hierarchy level when you use this procedure. Thus, the automatic image upgrade feature is made available on the switch.

## Revert to the Factory-Default Configuration by Using the `load factory-default` Command

The `load factory-default` command is a standard Junos OS configuration command that replaces the current active configuration with the factory-default configuration (except the root password setting, which by default is not set but which you must set in order to commit the new configuration in this procedure).

If you want to run the EZsetup script to complete the initial configuration of the switch after you revert to the factory-default configuration, do not use the `load factory-default` command. Instead, do the reversion by using the `request system zeroize` command. If you use the `load factory-default` command to revert to the factory-default configuration, the configuration for the root password is retained and the EZsetup script will not run.

To revert to the factory-default configuration by using the `load factory-default` command:



**NOTE:** If you use this procedure, you must delete the system commit factory settings, set the root password, and commit the configuration. These steps are not required when you revert to the factory-default configuration by using `request system zeroize`. Also, the `auto-image-upgrade` statement is not added to the configuration when you use this procedure; it *is* added to the configuration when you use `request system zeroize`.

1. [edit]  
user@switch# `load factory-default`
2. [edit]  
user@switch# `delete system commit factory-settings`
3. [edit]  
user@switch# `set system root-authentication plain-text-password`
4. [edit]  
user@switch# `commit`
5. Check the member ID and primary-role priority with the `show virtual-chassis` command and check to see whether there are remaining settings for uplink VCPs by using the `show virtual-chassis vc-port` command.

## Revert to the Factory-Default Configuration by Using the Factory Reset/Mode Button

To revert to the factory-default configuration by using the factory reset/mode button:

1. Press the factory reset/mode button on the far right side of the front panel for 10 seconds. The switch transitions into factory-default configuration, the console displays **committing factory default configuration**, and the Link/Activity LED on the network ports and the QSFP28 ports is lit steadily green.
2. Commit the configuration by using the CLI.
3. Press the factory reset/mode button for 10 more seconds. The switch transitions into initial setup mode.

EZSetup configures DHCP and enables the J-Web user interface on the switch. You can use EZSetup only on a standalone switch that is in the factory default configuration. For information about EZSetup, see [Connecting and Configuring an EX Series Switch \(J-Web Procedure\)](#).

The Factory Reset/Mode button is enabled by default. You can disable the button using the CLI.

To disable the Factory Reset/Mode button, run the following commands:

1. [edit]  
user@switch# set chassis config-button no-clear
2. [edit]  
user@switch# commit

To enable the Factory Reset/Mode button, run the following commands:

1. [edit]  
user@switch# delete chassis config-button no-clear
2. [edit]  
user@switch# commit

# 5

CHAPTER

## Maintain Components

---

### IN THIS CHAPTER

- Maintain the EX4400 Cooling System | 236
  - Maintain the EX4400 Power System | 239
  - Maintain the EX4400 Extension Modules | 245
  - Maintain Transceivers | 251
  - Maintain Fiber-Optic Cables | 257
  - Maintain Breakout Cables | 260
  - Maintain Direct Attach Cables | 265
  - Maintain Active Optical Cables | 270
-



# Maintain the EX4400 Cooling System

## IN THIS SECTION

- [Remove a Fan Module from an EX4400 Switch | 236](#)
- [Install a Fan Module in an EX4400 Switch | 238](#)

## Remove a Fan Module from an EX4400 Switch

Before you remove a fan module:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An antistatic bag or an antistatic mat—not provided
  - An ESD grounding strap—not provided
  - A replacement fan module

We ship EX4400 switches with 1+1 redundant fan modules preinstalled in the rear panel. The fan modules in EX4400 switches are hot-removable and hot-insertable field-replaceable unit (FRU) installed in the rear panel of the switch: You can remove and replace them without powering off the switch or disrupting switch functions.

To remove a fan module:

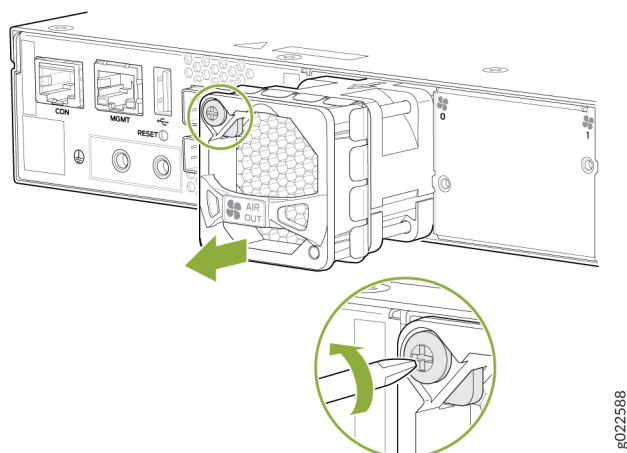
1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Loosen the captive screws on the front bezel of the fan module by using the screwdriver.



**WARNING:** To prevent injury, do not touch the fan with your hands or any tools as you slide the fan module out of the chassis—the fan might still be running.

4. Grasp the handle on the fan module and pull it firmly to slide the fan module out of the chassis (see [Figure 129 on page 237](#)).

**Figure 129: Remove a Fan Module from the EX4400 Switch**



5. Place the fan module in the antistatic bag or on the antistatic mat placed on a flat, stable surface.



**CAUTION:** Do not mix:

- Fan modules with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

If you install power supplies or fan modules with different airflow directions, Junos OS raises an alarm.

6. Install the replacement fan.



**NOTE:** You must install all the fan modules and they must be operational for optimal functioning of the switch.

If the switch is operational while you are replacing fan modules, you must remove only one fan module at a time. The switch continues to operate for 60 seconds without thermal shutdown while you are replacing a fan module.

## Install a Fan Module in an EX4400 Switch

Before you install a fan module in the switch:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have the correct fan module. If the label on the installed power supply is **AIR IN**, you must install a fan module with the label **AIR IN**. If the label on the installed power supply is **AIR OUT**, you must install a fan module with the label **AIR OUT**.
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An ESD grounding strap—not provided

We ship EX4400 switches with 1+1 redundant fan modules preinstalled in the rear panel. The fan modules in EX4400 switches are hot-removable and hot-insertable field-replaceable unit (FRU) installed in the rear panel of the switch: You can remove and replace them without powering off the switch or disrupting switch functions.



**CAUTION:** Do not mix:

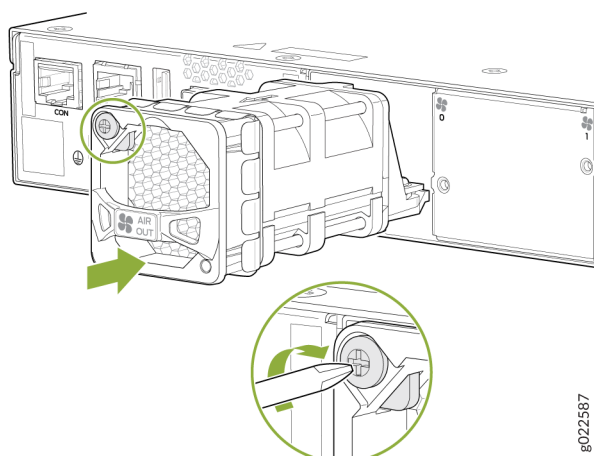
- Fan modules with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

If you install power supplies or fan modules with different airflow directions, Junos OS raises an alarm.

To install a fan module:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Remove the fan module from its bag.
3. Hold the handle of the fan module with one hand and support the weight of the module with the other hand. Place the fan module in the fan module slot on the rear panel of the switch and slide it in until it is fully seated.
4. Tighten the captive screws on the front bezel of the fan module by using the screwdriver (see [Figure 130 on page 239](#)).

**Figure 130: Install a Fan Module in the EX4400 Switch**



**NOTE:** If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/support/tools/updateinstallbase/>. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.



**NOTE:** You must install all the fan modules and they must be operational for optimal functioning of the switch.

The switch continues to operate for 60 seconds without thermal shutdown while you are replacing a fan module.

## Maintain the EX4400 Power System

### IN THIS SECTION

- Remove a Power Supply from an EX4400 Switch | 240
- Install a Power Supply in an EX4400 Switch | 242

## Remove a Power Supply from an EX4400 Switch

Before you remove a power supply from an EX4400 switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An antistatic bag or an antistatic mat—not provided
  - An ESD grounding strap—not provided
  - A replacement power supply

We ship EX4400 switches with one AC or DC power supply preinstalled in the rear panel. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running: You can remove and replace either one of them without powering off the switch or disrupting switch functions.



**CAUTION:** Replace the power supply with a new power supply within one minute of removal to prevent chassis overheating.

To remove a power supply:

1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

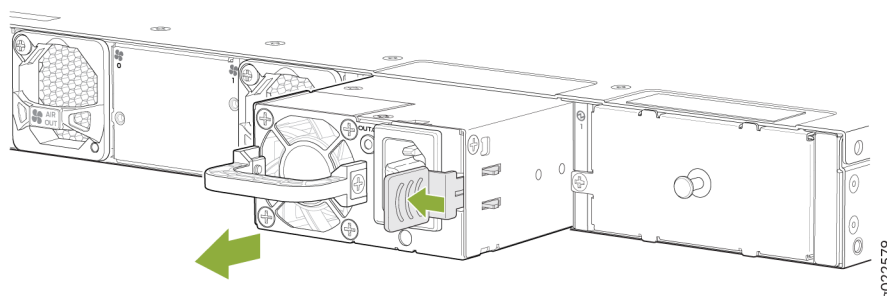


**NOTE:** If only one power supply is installed in your EX4400, you need to power off the switch before removing the power supply.

3. Disconnect power to the switch:
  - AC power supply—If the AC power source outlet has a power switch, set it to the off position. If the AC power source outlet does not have a power switch, gently pull out the plug end of the power cord connected to the power source outlet.
  - DC power supply—Switch the circuit breaker on the panel board that services the DC circuit to the off position.
4. Remove the power source cable from the power supply faceplate:

- AC power supply—Detach the power cord retainer by using your hands, and gently pull out the power cord.
  - DC power supply—Loosen the screws securing the DC power source cable by using the screwdriver, and gently pull out the power cord.
  - 2000-W DC power supply—Remove the power cord coupler from the inlet, pull the tab to disengage the snapped and locked coupler from the inlet, and then pull the coupler out.
5. Push the ejector lever toward the handle until it stops.
  6. Grasp the power supply handle and pull firmly to slide the power supply halfway out of the chassis.
  7. Place one hand under the power supply to support it and then slide it completely out of the chassis. Take care not to touch power supply components, pins, leads, or solder connections (see [Figure 131 on page 241](#), [Figure 132 on page 241](#), [Figure 133 on page 242](#), and [Figure 134 on page 242](#)).

**Figure 131: Remove an AC Power Supply from the EX4400 Switch**



**Figure 132: Remove a DC Power Supply from the EX4400 Switch**

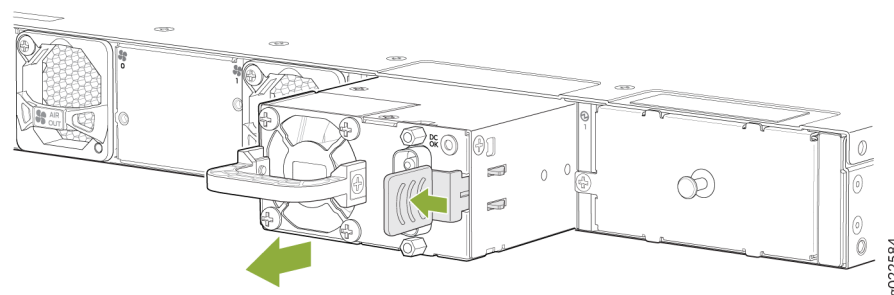


Figure 133: Remove a VDC Power Supply from the EX4400 Switch

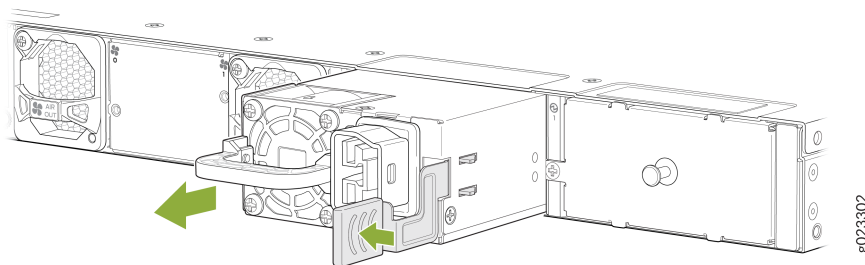
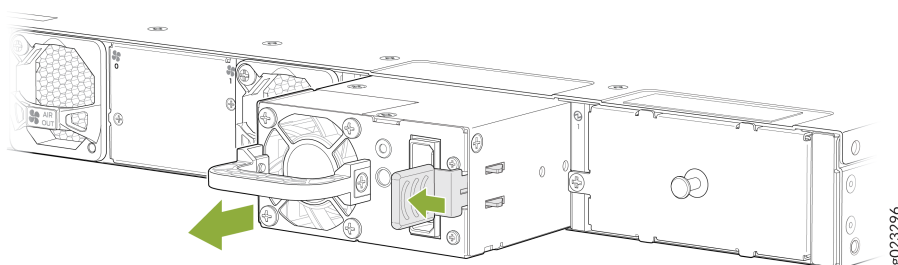


Figure 134: Remove a 2000-W DC Power Supply from the EX4400 Switch



8. Place the power supply in the antistatic bag or on the antistatic mat placed on a flat, stable surface.
9. Install the replacement power supply.



**NOTE:** You must install both the power supplies and they must be operational for optimal functioning of the switch.

## Install a Power Supply in an EX4400 Switch

Before you install a power supply:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have the correct power supply. If the label on the installed fan module is **AIR IN**, you must install a power supply with the label **AIR IN**. If the label on the installed fan module is **AIR OUT**, you must install a power supply with the label **AIR OUT**.

- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An ESD grounding strap—not provided

We ship EX4400 switches with one AC or DC power supply preinstalled in the rear panel. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running. You can remove and replace either one of them without powering off the switch or disrupting switch functions.



**CAUTION:** Do not mix:

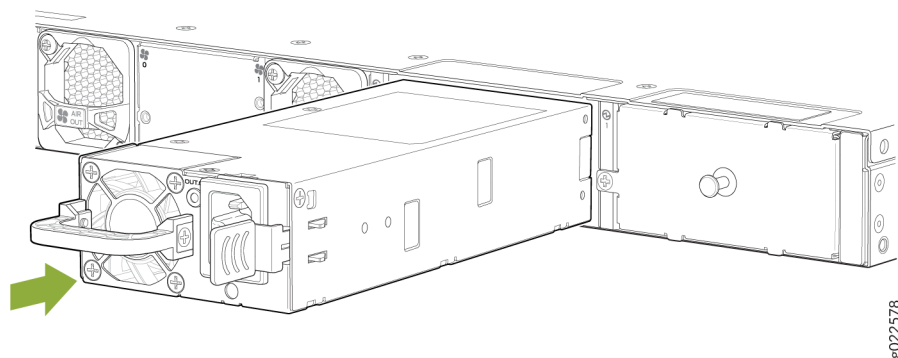
- AC and DC power supplies in the same chassis.
- Different models of power supplies (such as 550-W, 1050-W, 1600-W, and 2000-W models) in the same chassis.
- Power supplies with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

To install a power supply:

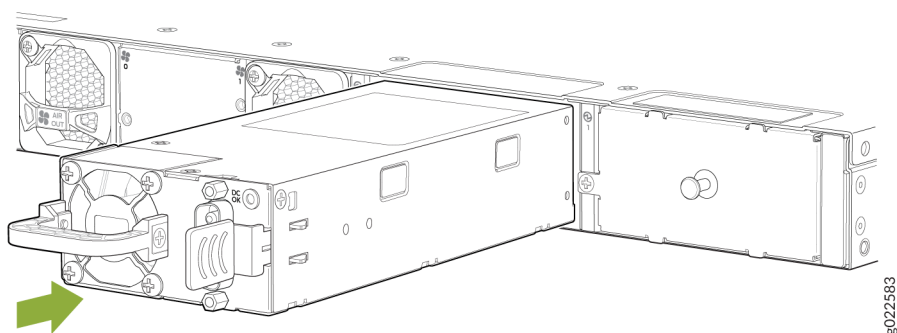
1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Taking care not to touch power supply pins, leads, or solder connections, remove the power supply from its bag.
3. If you are installing an AC power supply, push the end of the retainer strip into the hole below the inlet on the power supply faceplate until it snaps into place.
4. Using both hands, place the power supply in the power supply slot on the rear panel of the switch and slide it in until it is fully seated and the ejector lever fits into place (see [Figure 135 on page 244](#), [Figure 136 on page 244](#) and [Figure 138 on page 245](#)).



**Figure 135: Install an AC Power Supply in the EX4400 Switch**



**Figure 136: Install a DC Power Supply in the EX4400 Switch**



**Figure 137: Install a VDC Power Supply in the EX4400 Switch**

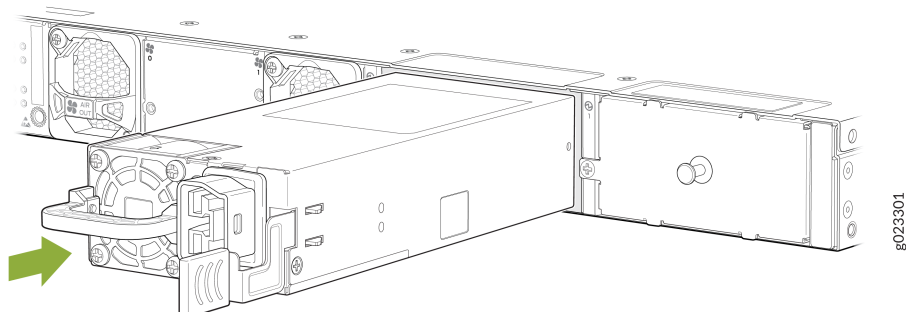
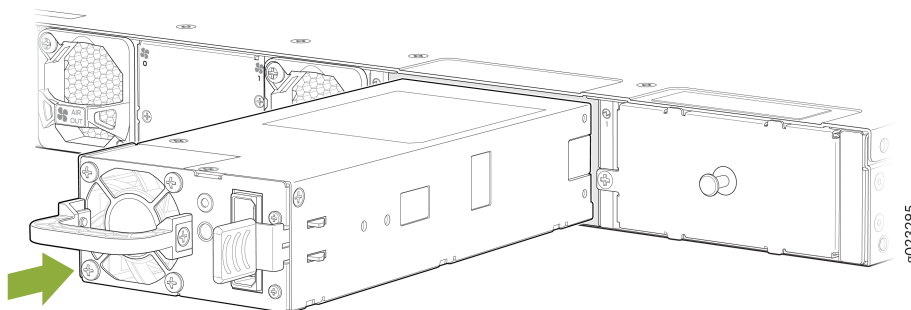


Figure 138: Install a 2000-W DC Power Supply in the EX4400 Switch



**NOTE:** If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/support/tools/updateinstallbase/>. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.



**NOTE:** You must install both the power supplies and they must be operational for optimal functioning of the switch.

## Maintain the EX4400 Extension Modules

### IN THIS SECTION

- [Remove an Extension Module from an EX4400 Switch | 245](#)
- [Install an Extension Module in an EX4400 Switch | 248](#)

### Remove an Extension Module from an EX4400 Switch

Before you remove an extension module from an EX4400 switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [Prevention of Electrostatic Discharge Damage](#)).
- If there are any transceivers installed in the extension module, remove them before you remove the extension module. For instructions on removing transceivers, see ["Maintain Transceivers" on page 251](#).
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An antistatic bag or an antistatic mat—not provided
  - An ESD grounding strap—not provided
  - A replacement extension module or cover for the empty extension module slot

The extension module in EX4400 switches is a hot-removable and hot-insertable field-replaceable unit (FRU). You can remove and replace an extension module without powering off the switch or disrupting switch functions.



**CAUTION:** We recommend that you install either a replacement extension module or a cover over the empty module slot to reduce the risk of objects or substances entering the chassis and to ensure optimal cooling of the switch.

To remove an extension module:

1. Take the extension module offline by issuing the following CLI command:

```
user@switch> request chassis pic offline fpc-slot slot-number pic-slot slot-number
```

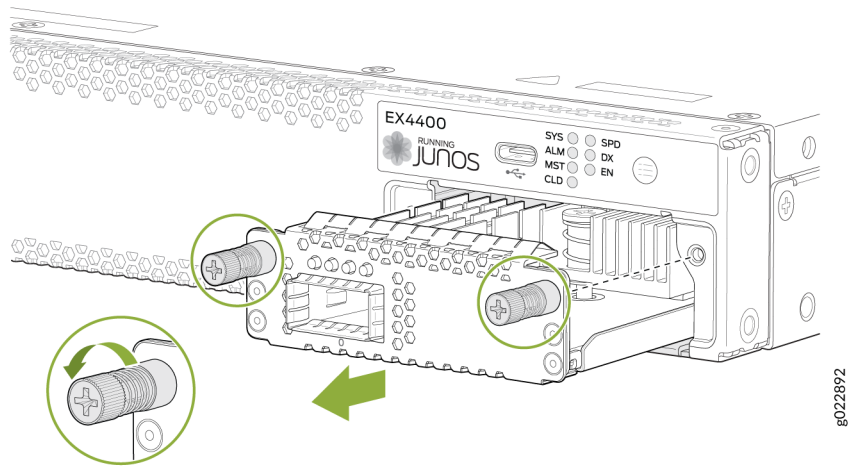
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Loosen both captive screws on the faceplate of the extension module by using your fingers. If you are unable to unscrew the captive screws by using your fingers, use the screwdriver.



**CAUTION:** Do not pull the extension module out of the module slot by holding the faceplate of the extension module.

4. Hold both the ejector handles or the captive screws on the extension module and gently pull the extension module toward you and out of the module slot (see [Figure 139 on page 247](#), [Figure 140 on page 247](#), and [Figure 141 on page 248](#)).

**Figure 139: Remove a 1x100GbE QSFP28 Extension Module from the EX4400 Switch**



**Figure 140: Remove a 4x10GbE SFP+ Extension Module from the EX4400 Switch**

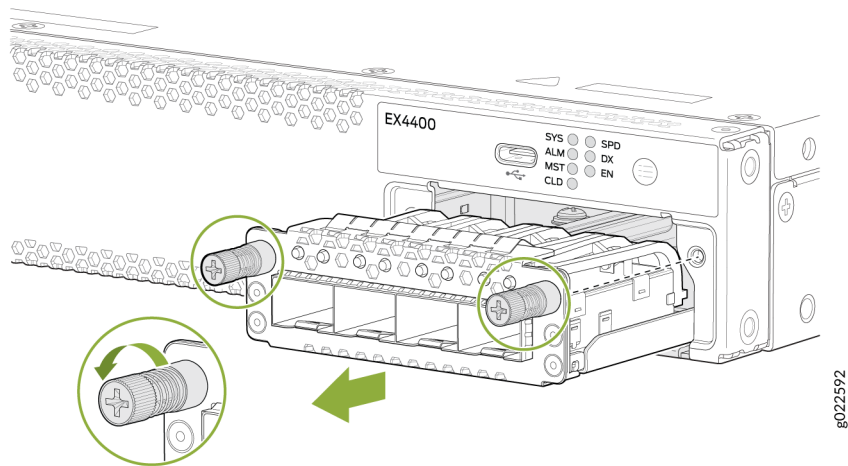
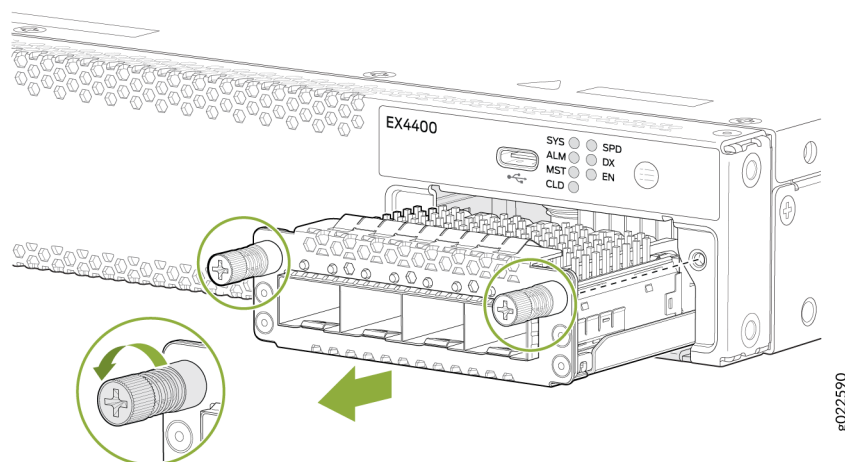


Figure 141: Remove a 4x25GbE SFP28 Extension Module from the EX4400 Switch



5. Place the extension module in an antistatic bag or on an antistatic mat placed on a flat, stable surface.
6. If you are not replacing the extension module, install the cover over the empty slot.



**NOTE:** After you have removed an extension module, wait for at least 10 seconds before you install an extension module. If you do not wait for at least 10 seconds, the interfaces on the extension module might not come up.

## Install an Extension Module in an EX4400 Switch

Before you begin installing an extension module in the switch:

- Ensure that you have taken the necessary precautions to prevent ESD damage (see [Prevention of Electrostatic Discharge Damage](#)).
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An ESD grounding strap—not provided (If a grounding strap is not available, follow the alternative grounding method described in Step 1 of the following procedure.)

You can install an extension module in the front panel of an EX4400 switch. The extension module in EX4400 switches is a hot-removable and hot-insertable unit (FRU). You can remove and replace an extension module without powering off the switch.



**NOTE:** Extension modules are not part of the shipping configuration. If you want to purchase them, you must order them separately and register them (see ["Update Base Installation Data" on page 170](#)).

To install an extension module:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

If a grounding strap is not available, hold the extension module in its antistatic bag in one hand and touch the exposed, bare metal of the switch with the other hand to ground yourself and the component.

2. If the extension module slot has a cover on it, loosen both the screws on the cover by using your fingers. If you are unable to unscrew the screws by using your fingers, use the screwdriver. Hold both the screws and gently pull the cover outward, and save it for later use.



**NOTE:** If you are removing an extension module and installing another extension module, wait for at least 10 seconds after removing the extension module before installing the new or the same extension module. If you do not wait for at least 10 seconds, the interfaces on the extension module might not come up.

3. Taking care not to touch module components, pins, leads, or solder connections, remove the extension module from its bag.



**CAUTION:** Before you slide the extension module into the slot on the switch chassis, ensure the extension module is aligned correctly. Misalignment might cause the pins to bend, making the extension module unusable.

4. Using both hands, place the module in the empty slot and slide it in gently until it is fully seated.
5. Tighten both the captive screws by using your fingers or the screwdriver (see [Figure 142 on page 250](#), [Figure 143 on page 250](#), and [Figure 144 on page 251](#)).

Figure 142: Install a 1x100GbE QSFP28 Extension Module in the EX4400 Switch

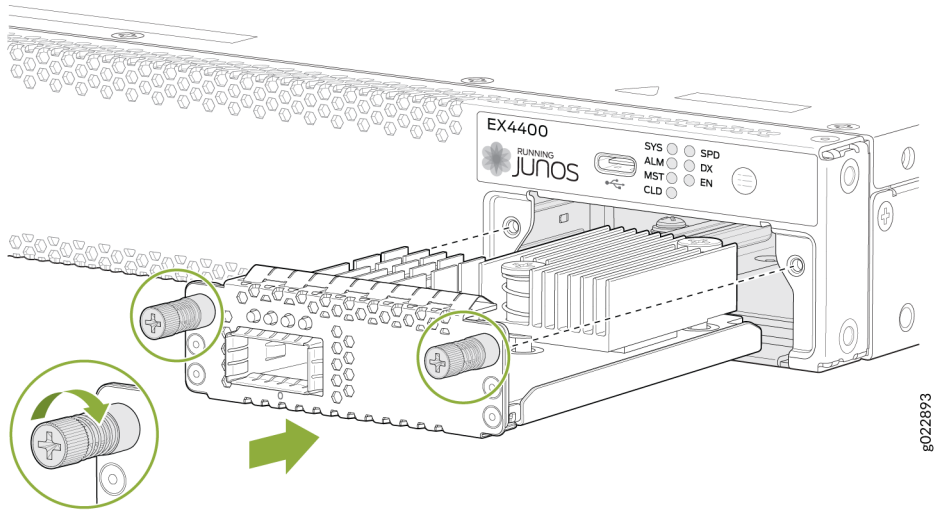


Figure 143: Install a 4x10GbE SFP+ Extension Module in the EX4400 Switch

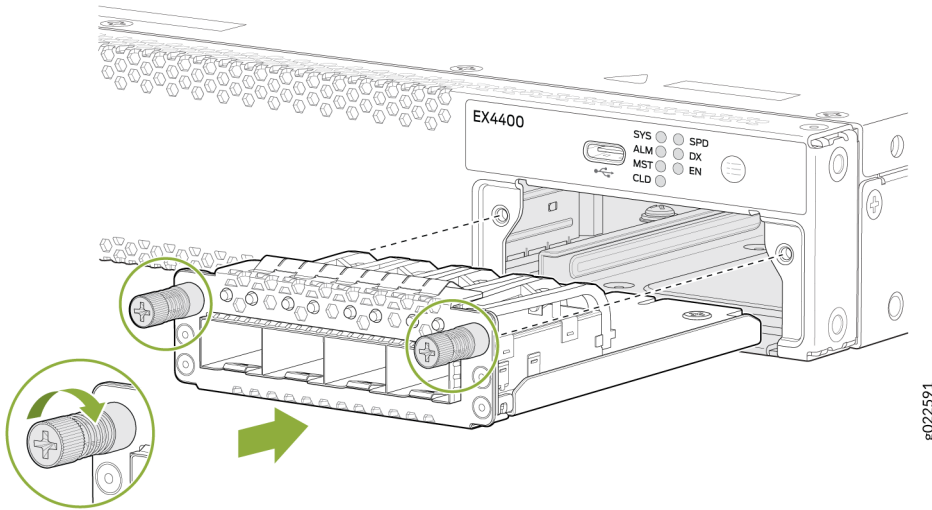
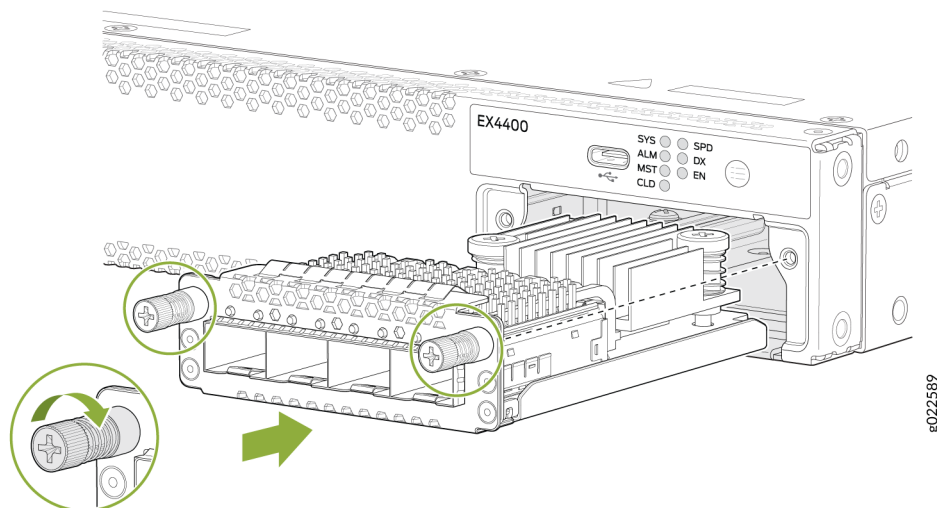


Figure 144: Install a 4x25GbE SFP28 Extension Module in the EX4400 Switch



**NOTE:** If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/support/tools/updateinstallbase/> . Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

## Maintain Transceivers

### IN THIS SECTION

- Remove a Transceiver | 252
- Install a Transceiver | 254



## Remove a Transceiver

Before you remove a transceiver from a device, ensure that you have taken the necessary precautions for the safe handling of lasers (see [Laser and LED Safety Guidelines and Warnings](#)).

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat
- Rubber safety caps to cover the transceiver and fiber-optic cable connector
- A dust cover to cover the port or a replacement transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace the transceivers without powering off the device or disrupting device functions.



**NOTE:** After you remove a transceiver, or when you change the media-type configuration, wait for 6 seconds for the interface to display the operational commands.

[Figure 145 on page 253](#) shows how to remove a quad small form-factor pluggable plus (QSFP+) transceiver. The procedure is the same for all types of transceivers except the QSFP28 and C form-factor pluggable (CFP) transceivers.

To remove a transceiver from a device:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the rack.
3. Label the cable connected to the transceiver so that you can reconnect it correctly.



**LASER WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.



**LASER WARNING:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and protects your eyes from accidental exposure to laser light.



**CAUTION:** Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

4. Remove the cable connected to the transceiver (see [Disconnect a Fiber-Optic Cable](#)). Cover the transceiver and the end of each fiber-optic cable connector with a rubber safety cap immediately after disconnecting the fiber-optic cables.
5. If there is a cable management system, arrange the cable in the cable management system to prevent it from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the lloop helps to maintain its shape.
6. To remove an SFP56-DD, SFP, SFP+, XFP, a QSFP+, or QSFP56-DD transceiver:
  - a. Using your fingers, pull open the ejector lever on the transceiver to unlock the transceiver.  
Note that QSFP-DD and SFP-DD transceivers don't have ejector levers, instead they have a pull tab which can be used to unlock and remove the transceiver.



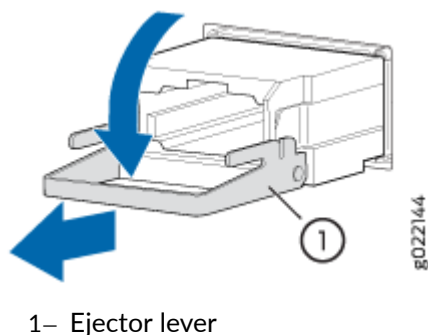
**CAUTION:** Before removing the transceiver, make sure that you open the ejector lever completely until you hear it click. This precaution prevents damage to the transceiver.

- b. Grasp the transceiver ejector lever and gently slide the transceiver approximately 0.5 in. (1.3 cm) straight out of the port.



**CAUTION:** To prevent ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

**Figure 145: Remove a QSFP+ Transceiver**



To remove a CFP transceiver:

- a. Using your fingers, loosen the screws on the transceiver.
- b. Grasp the screws on the transceiver and gently slide the transceiver approximately 0.5 in. (1.3 cm) straight out of the port.



**CAUTION:** To prevent ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

7. Using your fingers, grasp the body of the transceiver and pull it straight out of the port.
8. Place the transceiver in the antistatic bag or on the antistatic mat placed on a flat, stable surface.
9. Place the dust cover over the empty port, or install the replacement transceiver.

## Install a Transceiver

Before you install a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [Laser and LED Safety Guidelines and Warnings](#)).

Ensure that you have a rubber safety cap available to cover the transceiver.

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace the transceivers without powering off the device or disrupting the device functions.



**NOTE:** After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.



**NOTE:** We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.



**CAUTION:** The Juniper Networks Technical Assistance Center (JTAC) provides complete support for Juniper-supplied optical modules and cables. However, JTAC does not provide support for third-party optical modules and cables that are not qualified or supplied by Juniper Networks. If you face a problem running a Juniper device that uses third-party optical modules or cables, JTAC may help you diagnose host-related issues if the observed issue is not, in the opinion of JTAC, related to the use of the third-party

optical modules or cables. Your JTAC engineer will likely request that you check the third-party optical module or cable and, if required, replace it with an equivalent Juniper-qualified component.

Use of third-party optical modules with high-power consumption (for example, coherent ZR or ZR+) can potentially cause thermal damage to or reduce the lifespan of the host equipment. Any damage to the host equipment due to the use of third-party optical modules or cables is the users' responsibility. Juniper Networks will accept no liability for any damage caused due to such use.

Figure 146 on page 257 shows how to install a QSFP+ transceiver. The procedure is the same for all types of transceivers except the QSFP28 and CFP transceivers.

To install a transceiver:



**CAUTION:** To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point or to the ESD point on the device.
2. Remove the transceiver from its bag.
3. Check to see whether the transceiver is covered with a rubber safety cap. If it is not, cover the transceiver with a rubber safety cap.



**LASER WARNING:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and protects your eyes from accidental exposure to laser light.

4. If the port in which you want to install the transceiver is covered with a dust cover, remove the dust cover and save it in case you need to cover the port later. If you are hot-swapping a transceiver, wait for at least 10 seconds after removing the transceiver from the port before installing a new transceiver.
5. Using both hands, carefully place the transceiver in the empty port. The connectors must face the chassis.



**CAUTION:** Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the transceiver unusable.

6. Slide the transceiver in gently until it is fully seated. If you are installing a CFP transceiver, use your fingers to tighten the captive screws on the transceiver.

7. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.



**LASER WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.



**CAUTION:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and protects your eyes from accidental exposure to laser light.

8. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs toward the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.



**CAUTION:** Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.



**CAUTION:** Avoid bending the fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.



**NOTE:** When you install SFP-DD transceivers, push it hard until you hear a click sound. Use a long nose plier to pull the SFP-DD transceiver connected on the top and bottom rows of the chassis where the pull tabs face each other.

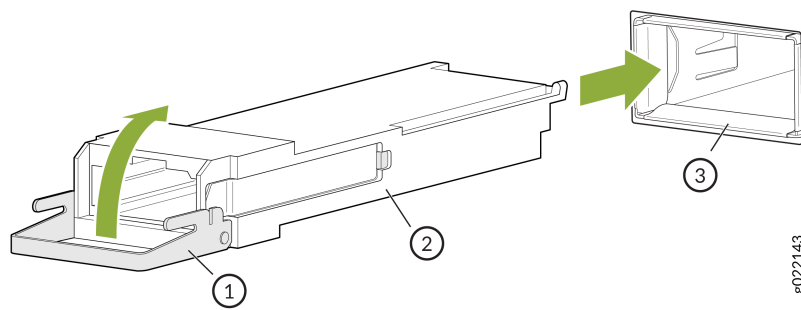


**NOTE:** Make sure to use a dust cap to cover ports that are unused.



**NOTE:** While using Finisar AOC SFP+ optical module with the QFX5130-48C switch, you may need to pull the module upwards to pull out the module smoothly from the cage.

Figure 146: Install a Transceiver



1– Ejector lever

3– Port

2– Transceiver

## Maintain Fiber-Optic Cables

### IN THIS SECTION

- [Connect a Fiber-Optic Cable | 257](#)
- [Disconnect a Fiber-Optic Cable | 258](#)
- [How to Handle Fiber-Optic Cables | 259](#)

### Connect a Fiber-Optic Cable

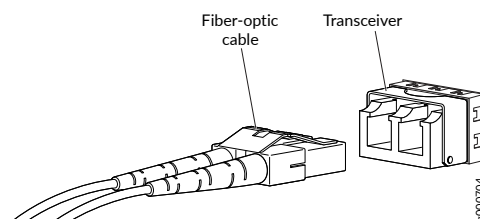
Before you connect a fiber-optic cable to an optical transceiver installed in a device, take the necessary precautions for safe handling of lasers (see [Laser and LED Safety Guidelines and Warnings](#)).

To connect a fiber-optic cable to an optical transceiver installed in a device:



**LASER WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. If the fiber-optic cable connector is covered with a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the optical transceiver. Save the cap.
3. Insert the cable connector into the optical transceiver.



4. Secure the cables so that they do not support their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.



**CAUTION:** Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

## Disconnect a Fiber-Optic Cable

Before you disconnect a fiber-optic cable from an optical transceiver, ensure that you have taken the necessary precautions for safe handling of lasers. See [Laser and LED Safety Guidelines and Warnings](#).

Ensure that you have the following parts and tools available:

- A rubber safety cap to cover the transceiver
- A rubber safety cap to cover the fiber-optic cable connector

Juniper Networks devices have optical transceivers to which you can connect fiber-optic cables.

To disconnect a fiber-optic cable from an optical transceiver installed in the device:

1. Disable the port in which the transceiver is installed by issuing the following command:

```
[edit interfaces]  
user@device# set interface-name disable
```



**LASER WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

2. Carefully unplug the fiber-optic cable connector from the transceiver.
3. Cover the transceiver with a rubber safety cap.



**LASER WARNING:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and protects your eyes from accidental exposure to laser light.

4. Cover the fiber-optic cable connector with the rubber safety cap.

## How to Handle Fiber-Optic Cables

Fiber-optic cables connect to optical transceivers that are installed in Juniper Networks devices.

Follow these guidelines when handling fiber-optic cables:

- When you unplug a fiber-optic cable from a transceiver, place rubber safety caps over the transceiver and on the end of the cable.
- Anchor fiber-optic cables to prevent stress on the connectors. When attaching a fiber-optic cable to a transceiver, secure the fiber-optic cable so that it does not support its own weight as it hangs to the floor. Never let a fiber-optic cable hang free from the connector.
- Avoid bending the fiber-optic cables beyond their minimum bend radius. Bending fiber-optic cables into arcs smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.
- Frequent plugging and unplugging of fiber-optic cables in and out of optical instruments can damage the instruments, which are expensive to repair. To prevent damage from overuse, attach a short fiber extension to the optical equipment. The short fiber extension absorbs wear and tear due to frequent plugging and unplugging. It is easier and more cost-efficient to replace the short fiber extension than to replace the instruments.



- Keep fiber-optic cable connections clean. Microdeposits of oil and dust in the canal of the transceiver or cable connector can cause loss of light, reduction in signal power, and possibly intermittent problems with the optical connection.
- To clean the transceiver canal, use an appropriate fiber-cleaning device such as RIFOCS Fiber Optic Adaptor Cleaning Wands (part number 946). Follow the instructions in the cleaning kit you use.
- After cleaning the transceiver, make sure that the connector tip of the fiber-optic cable is clean. Use only an approved alcohol-free fiber-optic cable cleaning kit such as the Opptex Cletop-S® Fiber Cleaner. Follow the instructions in the cleaning kit you use.

## Maintain Breakout Cables

### IN THIS SECTION

- [Disconnect a Breakout Cable | 260](#)
- [Connect a Breakout Cable | 263](#)

Breakout cables have one transceiver preattached to one end and more than one transceiver preattached to the other end. You can use the cables to channelize a port and increase the number of interfaces. For example, you can channelize the QSFP28 ports on the rear panel of EX4400 switches by connecting breakout cables and by using CLI configuration when those ports are configured as network ports (see *Port Settings*).

### Disconnect a Breakout Cable

Before you disconnect a breakout cable from a device, ensure that you have taken the necessary precautions for safe handling of laser (see [Laser and LED Safety Guidelines and Warnings](#)).

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat to store the cable, if you are disconnecting the cable from all the ports it is connected to
- Rubber safety caps to cover the ports on the device, or a replacement cable

- Rubber safety caps to cover the transceivers at the ends of the cable
- An electrostatic discharge (ESD) grounding strap—not provided

To disconnect a breakout cable:

1. Disable the port to which the cable is connected by issuing the following command:

```
[edit interfaces]  
user@device# set interface-name disable
```

2. Place the antistatic bag or antistatic mat on a flat, stable surface if you are disconnecting the cable from all the devices it is connected to.
3. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
4. Label the cable so that you can reconnect it correctly.



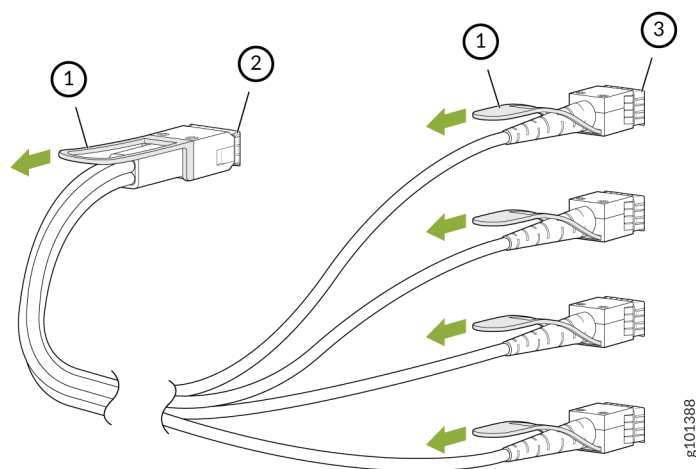
**CAUTION:** Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let the cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

5. By using your fingers, pull the tab on the transceiver attached to the cable to disengage it (see [Figure 147 on page 262](#)).

Figure 147: Disconnect a Breakout Cable



1– Tab to pull the transceiver

3– Port at the other end

2– Channelized port on a device

6. Grasp the transceiver and gently slide it approximately 0.5 in. (1.3 cm) straight out of the port.



**CAUTION:** To prevent ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

7. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.
8. Cover the transceiver with a rubber safety cap.
9. Secure the cable so that it does not support its own weight as it hangs to the floor. If there is a cable management system, arrange the cable in the cable management system to prevent it from dislodging or developing stress points. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.
10. If you are disconnecting the cable from all the devices it is connected to, place the cable in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

The procedure to disconnect other types of breakout cables is the same as the procedure described in this topic.

## Connect a Breakout Cable



**CAUTION:** To prevent ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

If you are connecting an active optic breakout cable to a device, ensure that you have taken the necessary precautions for safe handling of laser (see [Laser and LED Safety Guidelines and Warnings](#)).

Ensure that you have an electrostatic discharge (ESD) grounding strap (not provided).



**NOTE:** After you connect a cable or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.



**NOTE:** We recommend that you use only cables purchased from Juniper Networks with your Juniper Networks device.



**CAUTION:** If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

To connect a breakout cable:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Remove the cable from its bag.



**CAUTION:** Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

3. If the transceiver attached to the cable is covered with a rubber safety cap, remove the cap. Save the cap.
4. If the port on the device is covered with a rubber safety cap, remove the cap. Save the cap. If you are hot-swapping a cable, wait for at least 10 seconds after removing the cable from the port before installing a new cable.



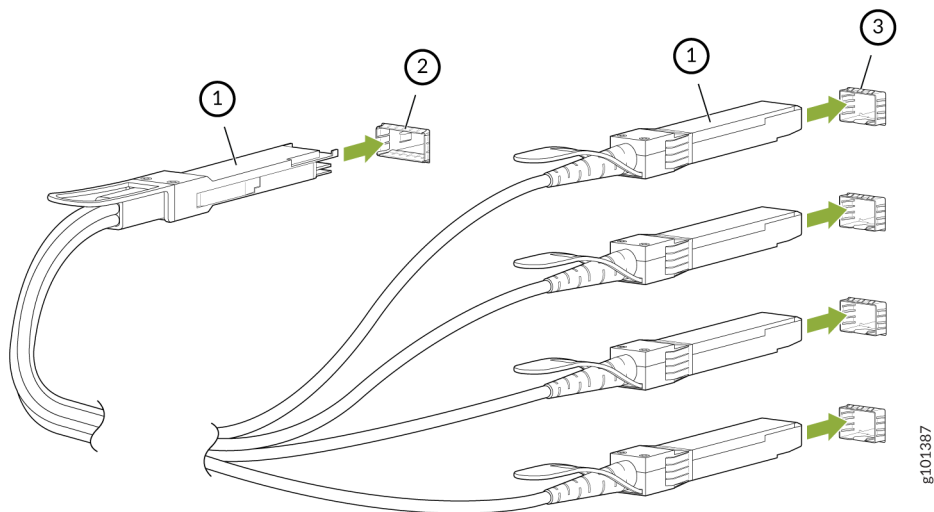
**CAUTION:** Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the cable unusable.

Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let the cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

5. By using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. Slide the transceiver in gently until it is fully seated (see [Figure 148 on page 264](#)).

**Figure 148: Connect a Breakout Cable**



1– Transceiver

2– Channelized port on a device

3– Ports at the other end

6. Repeat Step 5 for all ports to which the cable must be connected.
7. Secure the cable so that it does not support its own weight as it hangs to the floor. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.

The procedure to connect other types of breakout cables is the same as the procedure described in this topic.

# Maintain Direct Attach Cables

## IN THIS SECTION

- [Disconnect a Direct Attach Cable | 265](#)
- [Connect a Direct Attach Cable | 267](#)

A direct attach cable has a transceiver preattached to each end.

## Disconnect a Direct Attach Cable

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat to store the cable, if you are disconnecting the cable from both the ports it is connected to
- Rubber safety caps to cover the ports on the device, or a replacement cable
- Rubber safety caps to cover the transceivers at the ends of the cable
- An electrostatic discharge (ESD) grounding strap—not provided

To disconnect a direct attach cable:

1. Disable the port to which the cable is connected by issuing the following command:

```
[edit interfaces]  
user@device# set interface-name disable
```

2. Place the antistatic bag or antistatic mat on a flat, stable surface if you are disconnecting the cable from both the ports it is connected to.
3. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
4. Label the cable so that you can reconnect it correctly.



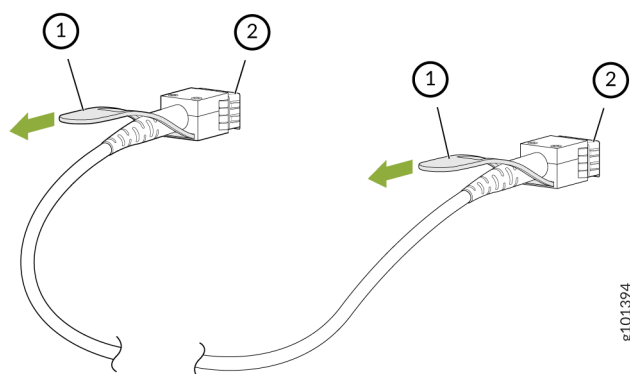
**CAUTION:** Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let the cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

5. By using your fingers, pull the tab on the transceiver attached to the cable to disengage it.

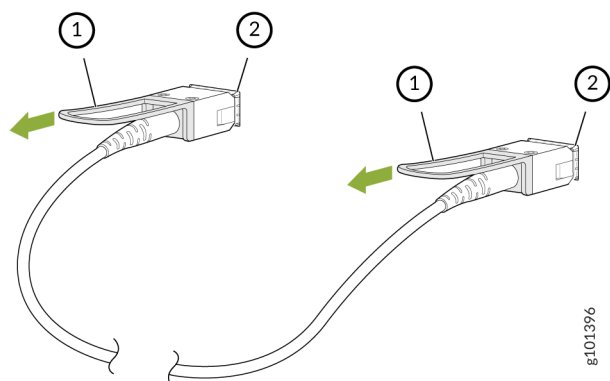
**Figure 149: Disconnect an SFP28 or SFP+ Direct Attach Cable**



1– Tab to pull the transceiver

2– Port on the device

Figure 150: Disconnect a SFP28, SFP+, or QSFP-DD Direct Attach Cable



1– Tab to pull the transceiver

2– Port on the device

6. Grasp the transceiver and gently slide it approximately 0.5 in. (1.3 cm) straight out of the port.



**CAUTION:** To prevent ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

7. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.
8. Cover the transceiver with a rubber safety cap.
9. If you are disconnecting the cable from both the ports it is connected to, place the cable in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

The procedure to disconnect other types of direct attach cables, other than direct attach breakout cables, is the same as the procedure described in this topic.

## Connect a Direct Attach Cable



**CAUTION:** To prevent ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

Ensure that you have an ESD grounding strap (not provided).



**NOTE:** After you connect a cable or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.





**NOTE:** We recommend that you use only cables purchased from Juniper Networks with your Juniper Networks device.



**CAUTION:** If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

To connect a direct attach cable:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Remove the cable from its bag.



**CAUTION:** Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

3. If the transceiver attached to the cable is covered with a rubber safety cap, remove the cap. Save the cap.
4. If the port on the device is covered with a rubber safety cap, remove the cap. Save the cap. If you are hot-swapping a cable, wait for at least 10 seconds after removing the cable from the port before installing a new cable.



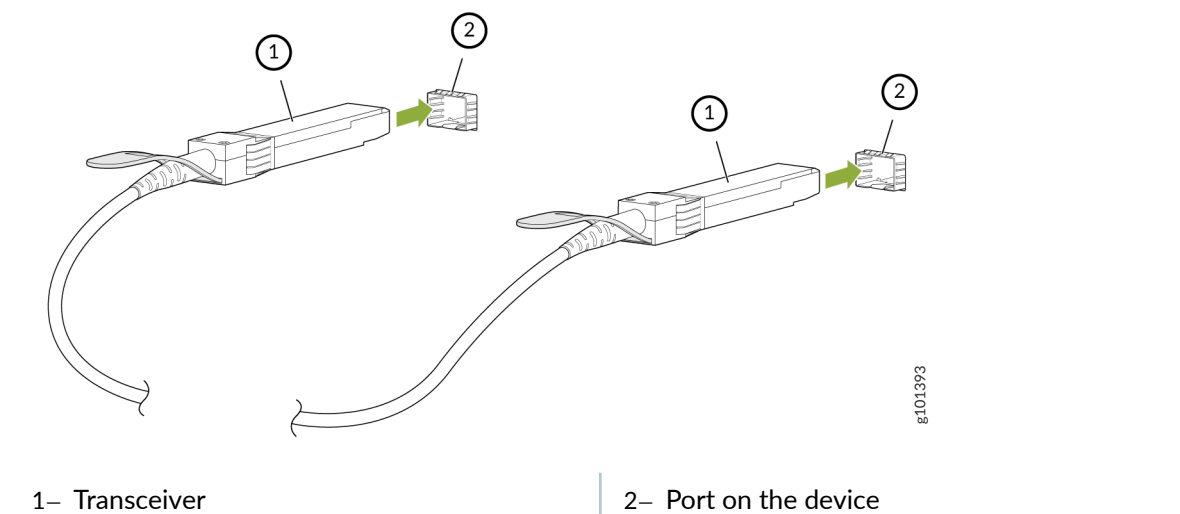
**CAUTION:** Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the cable unusable.

Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

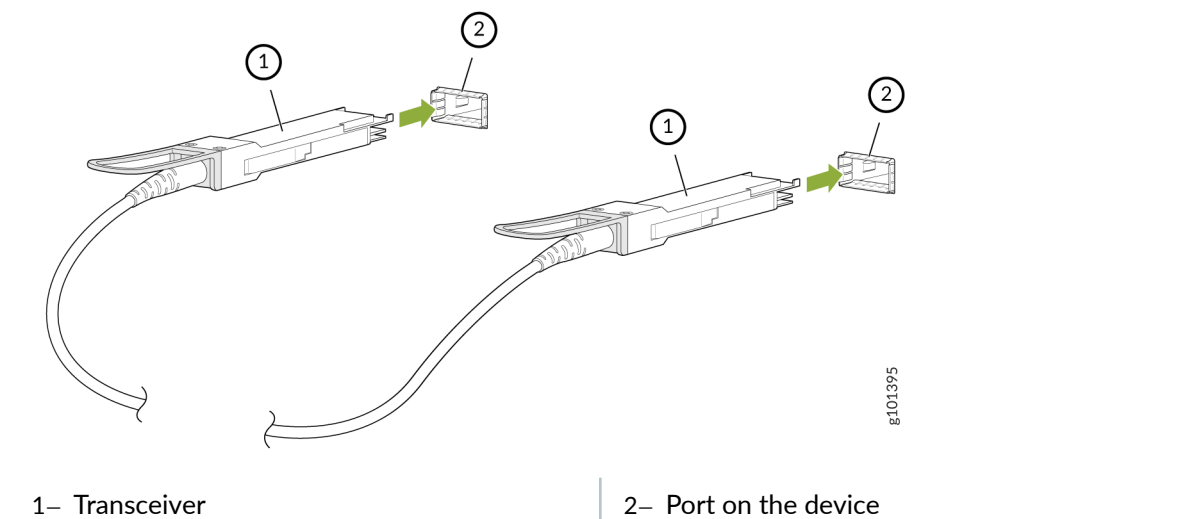
Do not let the cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

5. By using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. Slide the transceiver in gently until it is fully seated.

**Figure 151: Connect an SFP28 or SFP+ Direct Attach Cable**



**Figure 152: Connect a SFP28, SFP+, or QSFP-DD Direct Attach Cable**



6. Repeat Step 5 for all ports to which the cable must be connected.
7. Secure the cable so that it does not support its own weight as it hangs to the floor. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.

The procedure to connect other types of direct attach cables, other than direct attach breakout cables, is the same as the procedure described in this topic.

# Maintain Active Optical Cables

## IN THIS SECTION

- [Disconnect an Active Optical Cable | 270](#)
- [Connect an Active Optical Cable | 272](#)

An active optical cable (AOC) is an optical fiber cable that has a transceiver preattached to each end.

## Disconnect an Active Optical Cable

Before you disconnect an active optical cable (AOC) from a device, ensure that you have taken the necessary precautions for safe handling of laser (see [Laser and LED Safety Guidelines and Warnings](#)).

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat to store the cable, if you are disconnecting the cable from all the ports it is connected to
- Rubber safety caps to cover the ports on the device, or a replacement cable
- Rubber safety caps to cover the transceivers at the ends of the cable
- An electrostatic discharge (ESD) grounding strap—not provided

To disconnect an active optical cable:

1. Disable the port to which the cable is connected by issuing the following command:

```
[edit interfaces]  
user@device# set interface-name disable
```

2. Place the antistatic bag or antistatic mat on a flat, stable surface if you are disconnecting the cable from both the ports it is connected to.
3. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
4. Label the cable so that you can reconnect it correctly.



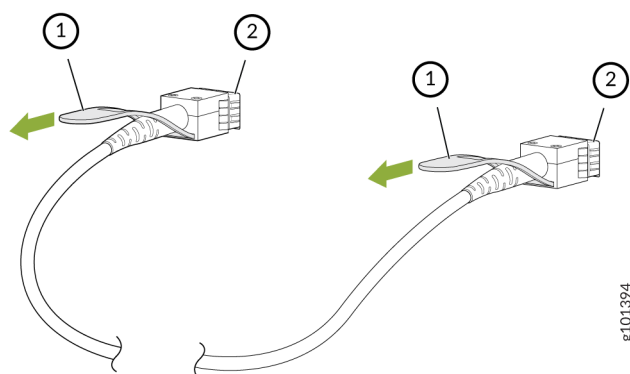
**CAUTION:** Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let the cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

5. By using your fingers, pull the tab on the transceiver attached to the cable to disengage it.

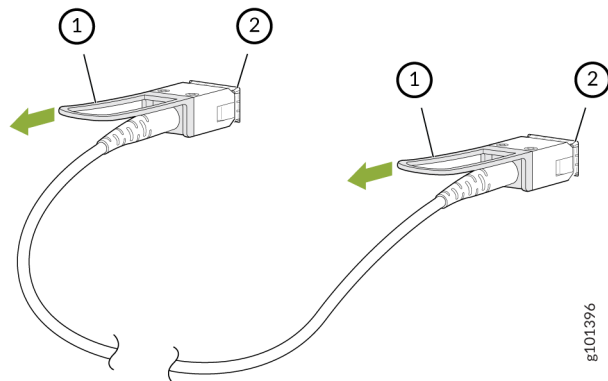
**Figure 153: Disconnect an SFP28 or SFP+ Active Optical Cable**



1– Tab to pull the transceiver

2– Port on the device

Figure 154: Disconnect a QSFP28 or QSFP+ Active Optical Cable



1– Tab to pull the transceiver

2– Port on the device

6. Grasp the transceiver and gently slide it approximately 0.5 in. (1.3 cm) straight out of the port.



**CAUTION:** To prevent ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

7. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.
8. Cover the transceiver with a rubber safety cap.
9. If you are disconnecting the cable from both the ports it is connected to, place the cable in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

The procedure to disconnect other types of AOCs, other than direct attach AOCs, is the same as the procedure described in this topic.

## Connect an Active Optical Cable

Before you connect an AOC to a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [Laser and LED Safety Guidelines and Warnings](#)).



**CAUTION:** To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

Ensure that you have an ESD grounding strap (not provided).



**NOTE:** After you connect a cable or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.



**NOTE:** We recommend that you use only cables purchased from Juniper Networks with your Juniper Networks device.



**CAUTION:** If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

To connect an active optical cable:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Remove the cable from its bag.



**CAUTION:** Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

3. If the transceiver attached to the cable is covered with a rubber safety cap, remove the cap. Save the cap.
4. If the port on the device is covered with a rubber safety cap, remove the cap. Save the cap. If you are hot-swapping a cable, wait for at least 10 seconds after removing the cable from the port before installing a new cable.



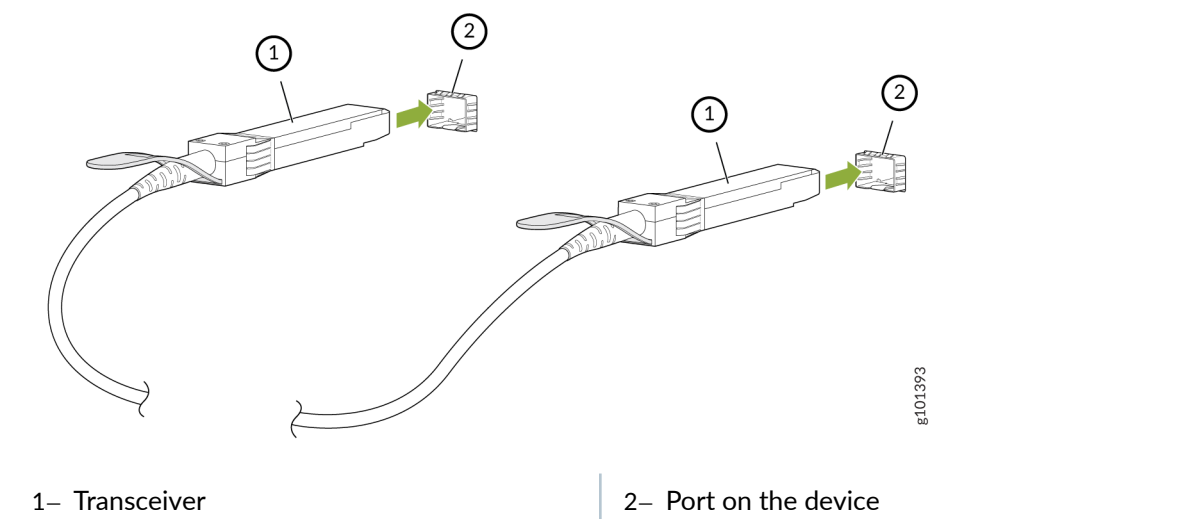
**CAUTION:** Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the cable unusable.

Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

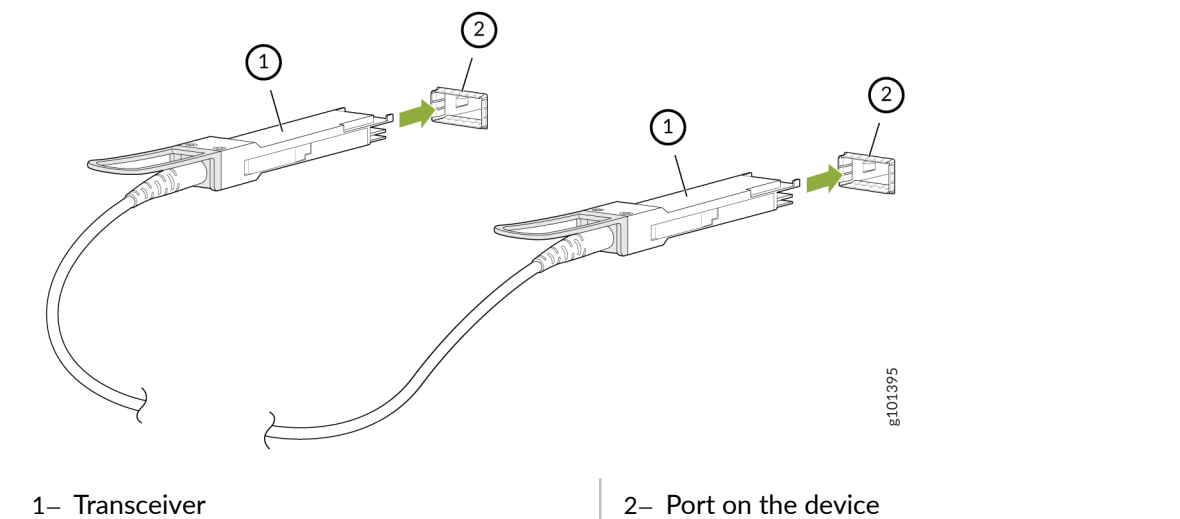
Do not let the cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

5. By using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. Slide the transceiver in gently until it is fully seated.

**Figure 155: Connect an SFP28 or SFP+ Active Optical Cable**



**Figure 156: Connect a QSFP28 or QSFP+ Active Optical Cable**



6. Repeat Step 5 for all ports to which the cable must be connected.
7. Secure the cable so that it does not support its own weight as it hangs to the floor. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.

The procedure to connect other types of AOCs, other than direct attach AOCs, is the same as the procedure described in this topic.



# 6

CHAPTER

## Troubleshoot Hardware

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### IN THIS CHAPTER

- [Troubleshoot the EX4400 Components | 277](#)
-

# Troubleshoot the EX4400 Components

## IN THIS SECTION

- [Troubleshoot Temperature Alarms in EX Series Switches | 277](#)
- [Chassis Component Alarm Conditions on EX4400 Switches | 283](#)
- [EX4400 Switch Hardware and CLI Terminology Mapping | 286](#)

## Troubleshoot Temperature Alarms in EX Series Switches

### IN THIS SECTION

- [Problem | 277](#)
- [Cause | 278](#)
- [Solution | 278](#)



**NOTE:** This topic is a generic one and applies to all EX Series Switches. There could be variations in output depending on the switch. For example, in a fan less switch such as EX4100-H-12MP, any fan related information does not apply.

### Problem

### Description

EX Series switches trigger a temperature alarm FPC 0 EX-PFE1 Temp Too Hot when the switch temperature becomes too hot.

## Cause

Temperature sensors in the chassis monitor the temperature of the chassis. The switch triggers an alarm if a fan fails or if the temperature of the chassis exceeds permissible levels for some other reason.

## Solution

When the switch triggers a temperature alarm such as the FPC 0 EX-PFE1 Temp Too Hot alarm, use the [show chassis environment](#) and the [show chassis temperature-thresholds](#) commands to identify the condition that triggered the alarm.



**CAUTION:** To prevent the switch from overheating, operate it in an area with an ambient temperature within the recommended range. To prevent airflow restriction, allow at least 6 inches (15.2 cm) of clearance around the ventilation openings. For EX4100-H-12MP switches, refer *Environmental Guidelines* in [EX4100-H Site Guidelines and Requirements](#).

1. Connect to the switch by using Telnet, and issue the [show chassis environment](#) command. This command displays environmental information about the switch chassis, including the temperature. The command also displays information about the fans, power supplies, and Routing Engines. Following is a sample output on an EX9208 switch. The output is similar on other EX Series switches. Note that for fan less switches such as EX4100-H-12MP, fan output will not display in the output.

### show chassis environment (EX9208 Switch)

```
user@switch> show chassis environment
```

Class	Item	Status	Measurement
Temp	PEM 0	OK	40 degrees C / 104 degrees F
	PEM 1	OK	40 degrees C / 104 degrees F
	PEM 2	Absent	
	PEM 3	Absent	
	Routing Engine 0	OK	37 degrees C / 98 degrees F
	Routing Engine 0 CPU	OK	35 degrees C / 95 degrees F
	Routing Engine 1	Absent	
	Routing Engine 1 CPU	Absent	
	CB 0 Intake	OK	36 degrees C / 96 degrees F
	CB 0 Exhaust A	OK	34 degrees C / 93 degrees F
	CB 0 Exhaust B	OK	40 degrees C / 104 degrees F
	CB 0 ACBC	OK	39 degrees C / 102 degrees F
	CB 0 XF A	OK	46 degrees C / 114 degrees F

	CB 0 XF B	OK	45 degrees C / 113 degrees F
	CB 1 Intake	Absent	
	CB 1 Exhaust A	Absent	
	CB 1 Exhaust B	Absent	
	CB 1 ACBC	Absent	
	CB 1 XF A	Absent	
	CB 1 XF B	Absent	
	FPC 3 Intake	OK	48 degrees C / 118 degrees F
	FPC 3 Exhaust A	OK	46 degrees C / 114 degrees F
	FPC 3 Exhaust B	OK	51 degrees C / 123 degrees F
	FPC 3 XL TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XL Chip	OK	58 degrees C / 136 degrees F
	FPC 3 XL_XR0 TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XL_XR0 Chip	OK	51 degrees C / 123 degrees F
	FPC 3 XL_XR1 TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XL_XR1 Chip	OK	63 degrees C / 145 degrees F
	FPC 3 XQ TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XQ Chip	OK	63 degrees C / 145 degrees F
	FPC 3 XQ_XR0 TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XQ_XR0 Chip	OK	68 degrees C / 154 degrees F
	FPC 3 XM TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XM Chip	OK	76 degrees C / 168 degrees F
	FPC 3 XF TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XF Chip	OK	75 degrees C / 167 degrees F
	FPC 3 PLX PCIe Switch TSe	OK	51 degrees C / 123 degrees F
	FPC 3 PLX PCIe Switch Chi	OK	54 degrees C / 129 degrees F
	FPC 3 Aloha FPGA 0 TSen	OK	51 degrees C / 123 degrees F
	FPC 3 Aloha FPGA 0 Chip	OK	70 degrees C / 158 degrees F
	FPC 3 Aloha FPGA 1 TSen	OK	51 degrees C / 123 degrees F
	FPC 3 Aloha FPGA 1 Chip	OK	75 degrees C / 167 degrees F
	FPC 5 Intake	Testing	
	FPC 5 Exhaust A	Testing	
	FPC 5 Exhaust B	Testing	
Fans	Top Rear Fan	OK	Spinning at intermediate-speed
	Bottom Rear Fan	OK	Spinning at intermediate-speed
	Top Middle Fan	OK	Spinning at intermediate-speed
	Bottom Middle Fan	OK	Spinning at intermediate-speed
	Top Front Fan	OK	Spinning at intermediate-speed
	Bottom Front Fan	OK	Spinning at intermediate-speed

Table 110 on page 280 lists the output fields for the show chassis environment command. The table lists output fields in the approximate order in which they appear.

**Table 110: show chassis environment Output Fields**

Field Name	Field Description
Class	<p>Information about the category or class of chassis component:</p> <ul style="list-style-type: none"> <li>Temp: Temperature of air flowing through the chassis in degrees Celsius (°C) and degrees Fahrenheit (°F)</li> <li>Fans: Information about the status of fans and blowers</li> </ul>
Item	<p>Information about the chassis components:</p> <ul style="list-style-type: none"> <li>Flexible PIC Concentrators (FPCs)—that is, the line cards</li> <li>Control Boards (CBs)</li> <li>Routing Engines</li> <li>Power entry modules (PEMs)—that is, the power supplies</li> </ul>
Status	<p>Status of the specified chassis component. For example, if Class is Fans, the fan status can be:</p> <ul style="list-style-type: none"> <li>OK: The fans are operational.</li> <li>Testing: The fans are being tested during initial power-on.</li> <li>Failed: The fans have failed or the fans are not spinning.</li> <li>Absent: The fan tray is not installed.</li> </ul>
Measurement	<p>Depends on the Class. For example, if Class is Temp, indicates the temperature in degrees Celsius (°C) and degrees Fahrenheit (°F). If the Class is Fans, indicates actual fan RPM.</p>

- Issue the command `show chassis temperature-thresholds`. This command displays the chassis temperature threshold settings. The following is a sample output on an EX9208 switch. The output is similar on other EX Series switches.

`show chassis temperature-thresholds (EX9208 Switch)`

```

user@ host> show chassis temperature-thresholds
Fan speed      Yellow alarm    Red alarm      Fire Shutdown

```

Item	(degrees C)		(degrees C)		(degrees C)		(degrees C)	
	Normal	High	Normal	Bad fan	Normal	Bad fan	Normal	
Chassis default	48	54	65	55	80	65	100	
Routing Engine 0	70	80	95	95	110	110	112	
FPC 3	55	60	75	65	105	80	110	
FPC 5	55	60	75	65	90	80	95	

The following table lists the output fields for the `show chassis temperature-thresholds` command. The table lists output fields in the approximate order in which they appear.

**Table 111: show chassis temperature-thresholds Output Fields**

Field Name	Field Description
<b>Item</b>	Chassis component. You can configure the threshold information for components such as the chassis, the Routing Engines, and FPC for each slot in each FRU to display in the output. By default, information is displayed only for the chassis and the Routing Engines.
<b>Fan speed</b>	<p>Temperature thresholds, in degrees Celsius, for the fans to operate at normal and at high speed.</p> <ul style="list-style-type: none"> <li>• <b>Normal</b>—The temperature threshold at which the fans operate at normal speed and when all the fans are present and functioning normally.</li> <li>• <b>High</b>—The temperature threshold at which the fans operate at high speed or when a fan has failed or is missing.</li> </ul> <p><b>NOTE:</b> An alarm is triggered when the temperature exceeds the threshold settings for a yellow, amber, or red alarm.</p>
<b>Yellow or amber alarm</b>	<p>Temperature threshold, in degrees Celsius, that triggers a yellow or amber alarm.</p> <ul style="list-style-type: none"> <li>• <b>Normal</b>—The temperature threshold that must be exceeded on the device to trigger a yellow or amber alarm when the fans are running at full speed.</li> <li>• <b>Bad fan</b>—The temperature threshold that must be exceeded on the device to trigger a yellow or amber alarm when one or more fans have failed or are missing.</li> </ul>

**Table 111: show chassis temperature-thresholds Output Fields (Continued)**

Field Name	Field Description
<b>Red alarm</b>	<p>Temperature threshold, in degrees Celsius, that triggers a red alarm.</p> <ul style="list-style-type: none"> <li>• <b>Normal</b>—The temperature threshold that must be exceeded on the device to trigger a red alarm when the fans are running at full speed.</li> <li>• <b>Bad fan</b>—The temperature threshold that must be exceeded on the device to trigger a red alarm when one or more fans have failed or are missing.</li> </ul>
<b>Fire shutdown</b>	<p>Temperature threshold, in degrees Celsius, at which the switch shuts down in case of fire.</p>

When a temperature alarm is triggered, you can identify the condition that triggered it by running the `show chassis environment` command to display the chassis temperature values for each component and comparing those with the temperature threshold values. You can display the temperature threshold values by running the `show chassis temperature-thresholds` command.

For example, for FPC 3:

- If the temperature of FPC 3 exceeds 55° C, the output indicates that the fans are operating at a high speed (no alarm is triggered).
- If the temperature of FPC 3 exceeds 65° C, a yellow alarm is triggered to indicate that one or more fans have failed.
- If the temperature of FPC 3 exceeds 75° C, a yellow alarm is triggered to indicate that the temperature threshold limit is exceeded.
- If the temperature of FPC 3 exceeds 80° C, a red alarm is triggered to indicate that one or more fans have failed.
- If the temperature of FPC 3 exceeds 105° C, a red alarm is triggered to indicate that the temperature threshold limit is exceeded.
- If the temperature of FPC 3 exceeds 110° C, the switch is powered off.

[Table 112 on page 283](#) lists the possible causes for the switch to generate a temperature alarm. It also lists the respective remedies.

**Table 112: Causes and Remedies for Temperature Alarms**

Cause	Remedy
Ambient temperature is above threshold temperature.	Ensure that the ambient temperature is within the threshold temperature limit. See <i>Environmental Requirements and Specifications for EX Series Switches</i> .
Fan module or fan tray has failed.	<p><b>NOTE:</b> This step is not applicable for fan less switches such as EX4100-H-12MP</p> <p>Perform the following steps:</p> <ol style="list-style-type: none"> <li>1. Check the fan.</li> <li>2. Replace the faulty fan module or fan tray.</li> <li>3. If the above two checks show no problems, open a support case using the Case Manager link at <a href="https://www.juniper.net/support/">https://www.juniper.net/support/</a> or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).</li> </ol>
Restricted airflow through the switch due to insufficient clearance around the installed switch.	Ensure that there is sufficient clearance around the installed switch.

## Chassis Component Alarm Conditions on EX4400 Switches

In this topic, you'll learn about alarm conditions on the components installed in the EX4400 switch chassis.

Table 113 on page 283 lists the alarms that the chassis components can generate on EX4400 switches, their severity levels, and the actions you can take to respond to them.

**Table 113: Alarm Conditions on EX4400 Switches**

Chassis Component	Alarm Condition	Alarm Severity	Remedy
<b>Fan modules</b>	Fan module is not installed.	Major (red)	Install the fan module.



Table 113: Alarm Conditions on EX4400 Switches (*Continued*)

Chassis Component	Alarm Condition	Alarm Severity	Remedy
	Mix of fan modules with different airflow directions.	Major (red)	Do not mix fan modules with different directions for the airflow in the same chassis.
	Mix of fan modules and power supplies with different airflow directions.	Major (red)	Do not mix fan modules and power supplies with different directions for the airflow in the same chassis.
<b>Power supplies</b>	A power supply is removed from the chassis.	Major (red)	Install a power supply in the empty slot.
	The power supply is not switched on.	Minor (yellow)	Check the input connection to the power supply.
	An unknown power supply is installed.	Major (red)	Install a power supply recommended by Juniper Networks.
	Mix of power supplies with different airflow directions.	Major (red)	Do not mix power supplies with different airflow directions in the same chassis.
	Mix of fan modules and power supplies with different airflow directions.	Major (red)	Do not mix fan modules and power supplies with different airflow directions in the same chassis.
	Mix of AC and DC PSUs	Major (red)	Do not mix AC, DC, and VDC power supplies in the same chassis.
<b>Temperature</b>	The temperature inside the chassis reaches the yellow alarm limit.	Minor (yellow)	<ul style="list-style-type: none"> <li>• Check the fan.</li> <li>• Open a support case using the Case Manager link at <a href="https://www.juniper.net/support/">https://www.juniper.net/support/</a> or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).</li> </ul>

Table 113: Alarm Conditions on EX4400 Switches (*Continued*)

Chassis Component	Alarm Condition	Alarm Severity	Remedy
	The temperature inside the chassis reaches the red alarm limit.	Major (red)	<ul style="list-style-type: none"> <li>Check the fan.</li> <li>Open a support case using the Case Manager link at <a href="https://www.juniper.net/support/">https://www.juniper.net/support/</a> or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).</li> </ul>
	The temperature sensor has failed.	Major (red)	Open a support case using the Case Manager link at <a href="https://www.juniper.net/support/">https://www.juniper.net/support/</a> or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).
<b>Management Ethernet interface</b>	Management Ethernet link is down.	Major (red)	<ul style="list-style-type: none"> <li>Check whether a cable is connected to the management Ethernet interface, or whether the cable is defective. Replace the cable if required.</li> <li>If you are unable to resolve the problem, then open a support case using the Case Manager link at <a href="https://www.juniper.net/support/">https://www.juniper.net/support/</a> or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).</li> </ul>
<b>Routing Engine</b>	/var partition usage is high.	Minor (yellow)	Clean up the system file storage space on the switch. For more information, see <i>Freeing Up System Storage Space</i> .
	/var partition is full.	Major (red)	Clean up the system file storage space on the switch. For more information, see <i>Freeing Up System Storage Space</i> .

**Table 113: Alarm Conditions on EX4400 Switches** *(Continued)*

Chassis Component	Alarm Condition	Alarm Severity	Remedy
	Rescue configuration is not set.	Minor (yellow)	Use the request system configuration rescue save command to set the rescue configuration.
	Feature usage requires a license or the license for the feature usage has expired.	Minor (yellow)	Install the required license for the feature specified in the alarm. For more information, see <i>Understanding Software Licenses for EX Series Switches</i> .

## EX4400 Switch Hardware and CLI Terminology Mapping

This topic describes the hardware terms used in EX4400 switch documentation and the corresponding terms used in the Junos OS CLI (see [Table 114 on page 287](#)).

Table 114: CLI Equivalents of Terms Used in the Documentation for EX4400 Switches

Hardware Item (CLI)	Description (CLI)	Value	Item In Documentation	Additional Information
Chassis	One of the following: <ul style="list-style-type: none"> <li>EX4400-24T</li> <li>EX4400-24P</li> <li>EX4400-24MP</li> <li>EX4400-24X</li> <li>EX4400-48T</li> <li>EX4400-48P</li> <li>EX4400-48MP</li> <li>EX4400-48F</li> </ul>	-	Switch chassis	<a href="#">"EX4400 Models and Specifications" on page 17</a>
Routing Engine ( <i>n</i> )	One of the following: <ul style="list-style-type: none"> <li>RE-EX4400-24T</li> <li>RE-EX4400-24P</li> <li>RE-EX4400-24MP</li> <li>RE-EX4400-24X</li> <li>RE-EX4400-48T</li> <li>RE-EX4400-48P</li> <li>RE-EX4400-48MP</li> <li>RE-EX4400-48F</li> </ul>	<i>n</i> is a value in the range 0 through 9. <ul style="list-style-type: none"> <li>In a standalone switch, the default value is 0.</li> <li>In a Virtual Chassis configuration, the values correspond to the member IDs of switches configured in the primary role and the backup role in the Virtual Chassis.</li> </ul>	Routing Engine	-

Table 114: CLI Equivalents of Terms Used in the Documentation for EX4400 Switches *(Continued)*

Hardware Item (CLI)	Description (CLI)	Value	Item In Documentation	Additional Information
FPC ( <i>n</i> )	<p>Abbreviated name of the Flexible PIC Concentrator (FPC)</p> <p>One of the following:</p> <ul style="list-style-type: none"> <li>• EX4400-24T</li> <li>• EX4400-24P</li> <li>• EX4400-24MP</li> <li>• EX4400-24X</li> <li>• EX4400-48T</li> <li>• EX4400-48P</li> <li>• EX4400-48XP</li> <li>• EX4400-48MXP</li> <li>• EX4400-48MP</li> <li>• EX4400-48F</li> </ul>	<p><i>n</i> is a value in the range 0 through 9.</p> <p>In a standalone switch, the default value is 0.</p> <p>In a Virtual Chassis configuration, the values correspond to the assigned member IDs of switches in the Virtual Chassis.</p>	<p>In this case, FPC refers to the switch itself.</p> <p>In this case, the FPC number refers to the member ID assigned to the switch.</p>	<a href="#">Understanding Interface Naming Conventions</a>
PIC ( <i>n</i> )	Abbreviated name of the Physical Interface Card (PIC)	<i>n</i> is a value in the range 0 through 2.		<a href="#">Understanding Interface Naming Conventions</a>

Table 114: CLI Equivalents of Terms Used in the Documentation for EX4400 Switches *(Continued)*

Hardware Item (CLI)	Description (CLI)	Value	Item In Documentation	Additional Information
	<p>One of the following:</p> <ul style="list-style-type: none"> <li>EX4400-24T or EX4400-24P switch: 24x10M/100M/1G</li> <li>EX4400-24MP switch: 24x100M/1G/2.5G/5G/10G Base-T</li> <li>EX4400-24X switch: 24x 1G/10G SFP/SFP+</li> <li>EX4400-48T or EX4400-48P switch: 48x10M/100M/1G</li> <li>EX4400-48XP switch: 48x10M/100M/1G</li> <li>EX4400-48MP switch: 36x100M/1G/2.5G Base-T &amp; 12x100M/1G/2.5G/5G/10G Base-T</li> <li>EX4400-48MXP switch: 36x 10M/100M/1G/2.5G &amp;</li> </ul>	PIC 0	PIC 0 stands for built-in network ports numbered <b>0</b> through <b>23</b> or <b>0</b> through <b>47</b>	<a href="#">"EX4400 System Overview" on page 8</a>

Table 114: CLI Equivalents of Terms Used in the Documentation for EX4400 Switches *(Continued)*

Hardware Item (CLI)	Description (CLI)	Value	Item In Documentation	Additional Information
	12x 100M/ 1/2.5/5/10G <ul style="list-style-type: none"> <li>EX4400-48F switch: 36x1G SFP, 12x1G/10G SFP/SFP+</li> </ul>			
	One of the following: <ul style="list-style-type: none"> <li>2x100G QSFP28 VCP</li> <li>2x100G QSFP28 (EX4400-24X)</li> </ul>	PIC 1	QSFP28 ports numbered 0 and 1	
	One of the following: <ul style="list-style-type: none"> <li>4x10G SFP+</li> <li>4x25G SFP28</li> <li>1x100G QSFP28</li> </ul>	PIC 2	Extension module installed in the switch	<a href="#">"Extension Modules in EX4400 Switches" on page 12</a>
Xcvr ( <i>n</i> )	Abbreviated name of the transceiver	<i>n</i> is a value equivalent to the number of the port in which the transceiver is installed.	Optical transceivers	<a href="#">"Pluggable Transceivers and Cables Supported on EX4400 Switches" on page 150</a>

Table 114: CLI Equivalents of Terms Used in the Documentation for EX4400 Switches *(Continued)*

Hardware Item (CLI)	Description (CLI)	Value	Item In Documentation	Additional Information
Power supply ( <i>n</i> )	One of the following: <ul style="list-style-type: none"> <li>• JPSU-550-C-AC-AFO</li> <li>• JPSU-550-C-AC-AFI</li> <li>• JPSU-550-C-DC-AFO</li> <li>• JPSU-550-C-DC-AFI</li> <li>• JPSU-1050-C-AC-AFO</li> <li>• JPSU-1600-C-AC-AFO</li> <li>• JPSU-2000-C-AC-AFO</li> <li>• JPSU-2000-C-DC-AFO</li> </ul>	<i>n</i> has a value 0 or 1, corresponding to the power supply slot number.	AC power supply or DC power supply	<ul style="list-style-type: none"> <li>• <a href="#">"AC Power Supply in EX4400 Switches" on page 105</a></li> <li>• <a href="#">"DC Power Supply in EX4400 Switches" on page 123</a></li> </ul>
Fan tray	One of the following: <ul style="list-style-type: none"> <li>• Fan Module, Airflow In (AFI)</li> <li>• Fan Module, Airflow Out (AFO)</li> </ul>	<i>n</i> has a value 0 or 1, corresponding to the fan module slot number.	Fan module	<a href="#">"Cooling System and Airflow in an EX4400 Switch" on page 88</a>

CLI Equivalents of Terms Used in the Documentation for EX4400 Switches



# 7

CHAPTER

## Contact Customer Support and Return the Chassis or Components

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### IN THIS CHAPTER

- [Return an EX4400 Chassis or Components](#) | 293
-

# Return an EX4400 Chassis or Components

## IN THIS SECTION

- [How to Return an EX4400 Switch or Component for Repair or Replacement | 293](#)
- [Locate the Serial Number on an EX4400 Switch or Component | 294](#)
- [Contact Customer Support to Obtain a Return Material Authorization | 305](#)
- [Pack an EX4400 Switch or Component for Shipping | 306](#)

## How to Return an EX4400 Switch or Component for Repair or Replacement

If you need to return a switch or hardware component to Juniper Networks for repair or replacement, follow this procedure:

1. Determine the serial number of the chassis if you need to return the switch. If you need to return one or more components, determine the serial number for each component. For instructions, see ["Locate the Serial Number on an EX4400 Switch or Component" on page 294](#).
2. Obtain a Return Material Authorization (RMA) number from Juniper Networks Technical Assistance Center (JTAC) as described in ["Contact Customer Support to Obtain a Return Material Authorization" on page 305](#).



**NOTE:** Do not return any component to Juniper Networks unless you have first obtained an RMA number. Juniper Networks reserves the right to refuse shipments that do not have an RMA. Refused shipments are returned to the customer through collect freight.

3. Pack the switch or component for shipping as described in ["Pack an EX4400 Switch or Component for Shipping" on page 306](#).

For more information about return and repair policies, see the customer support page at <https://www.juniper.net/support/guidelines.html>.

## Locate the Serial Number on an EX4400 Switch or Component

### IN THIS SECTION

- [List the Switch and Components Details with the CLI | 294](#)
- [Locate the Chassis Serial Number ID Label on an EX4400 Switch | 299](#)
- [Locate the Serial Number ID Labels on FRUs in an EX4400 Switch | 300](#)

If you are returning a switch or hardware component to Juniper Networks for repair or replacement, you must locate the serial number of the switch or component. You must provide the serial number to the Juniper Networks Technical Assistance Center (JTAC) when you contact them to obtain Return Material Authorization (RMA).

If the switch is operational and you can access the CLI, you can list serial numbers for the switch and for some components with a CLI command. If you do not have access to the CLI or if the serial number for the component does not appear in the command output, you can locate the serial number ID label on the physical switch or component.



**NOTE:** If you want to find the serial number on the physical switch component, you will need to remove the component from the switch chassis, for which you must have the required parts and tools available.

### List the Switch and Components Details with the CLI

To list the switch and switch components and their serial numbers, enter the CLI command `show chassis hardware extensive`.

The following output lists the switch components and serial numbers for an EX4400-48F switch. The output is similar for the other models.

```
user@switch> show chassis hardware extensive
Hardware inventory:
Item           Version  Part number  Serial number  Description
Chassis
Jedec Code:    0x0000      EEPROM Version:  0x00
S/N:           YK4319500020
Assembly ID:   0xf000      Assembly Version: 00.00
Date:          00-00-0000  Assembly Flags:  0x00
```

## Board Information Record:

Address 0x00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

## I2C Hex Data:

Address 0x00: 00 00 00 00 f0 00 00 00 00 00 00 00 00 00 00 00

Address 0x10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Address 0x20: 59 4b 34 33 31 39 35 30 30 30 32 30 00 00 00 00

Address 0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Address 0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Address 0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Address 0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

## Pseudo CB 1

Routing Engine 1            BUILTIN            BUILTIN            RE-EX4400-48F

Jedec Code:    0x7fb0            EEPROM Version:    0x02

P/N:            BUILTIN            S/N:                BUILTIN

Assembly ID:   0xf010            Assembly Version:   01.01

Date:           12-19-2019            Assembly Flags:    0x00

CLEI Code:        DUMMY\_CLEI

FRU Model Number: EX4400-48F-S

## Board Information Record:

Address 0x00: ad ff 80 00 c0 bf a7 00 eb a0 ff ff ff ff ff ff

## I2C Hex Data:

Address 0x00: 7f b0 02 fc f0 10 01 01 00 00 00 00 00 00 00 00

Address 0x10: 00 00 00 00 42 55 49 4c 54 49 4e 00 00 00 00 00

Address 0x20: 42 55 49 4c 54 49 4e 00 00 00 00 00 00 13 0c 07

Address 0x30: e3 ff ff ff ad ff 80 00 c0 bf a7 00 eb a0 ff ff

Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 5f 43 4c 45 49 45

Address 0x50: 58 34 34 30 30 2d 34 38 46 2d 53 00 00 00 00 00

Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff

Address 0x70: ff ff ff f4 59 4b 34 33 31 39 35 30 30 30 32 30

FPC 1            REV 01    650-114385    YK4319500020    EX4400-48F

Jedec Code:    0x7fb0            EEPROM Version:    0x02

P/N:            650-114385            S/N:                YK4319500020

Assembly ID:   0x0d5c            Assembly Version:   01.01

Date:           12-19-2019            Assembly Flags:    0x00

Version:        REV 01            CLEI Code:           DUMMY\_CLEI

ID: EX4400-48F            FRU Model Number: EX4400-48F-S

## Board Information Record:

Address 0x00: ad ff 80 00 c0 bf a7 00 eb a0 ff ff ff ff ff ff

## I2C Hex Data:

Address 0x00: 7f b0 02 fc 0d 5c 01 01 52 45 56 20 30 31 00 00

Address 0x10: 00 00 00 00 36 35 30 2d 31 31 34 33 38 35 00 00

Address 0x20: 59 4b 34 33 31 39 35 30 30 30 32 30 00 13 0c 07

Address 0x30: e3 ff ff ff ad ff 80 00 c0 bf a7 00 eb a0 ff ff

Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 5f 43 4c 45 49 45

Address 0x50: 58 34 34 30 30 2d 34 38 46 2d 53 00 00 00 00 00

Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff

Address 0x70: ff ff ff f4 59 4b 34 33 31 39 35 30 30 30 32 30

CPU BUILTIN BUILTIN FPC CPU

Jedec Code: 0x7fb0 EEPROM Version: 0x02

P/N: BUILTIN S/N: BUILTIN

Assembly ID: 0xf020 Assembly Version: 01.01

Date: 12-19-2019 Assembly Flags: 0x00

#### Board Information Record:

Address 0x00: ad ff 80 00 c0 bf a7 00 eb a0 ff ff ff ff ff ff

#### I2C Hex Data:

Address 0x00: 7f b0 02 fc f0 20 01 01 00 45 56 20 30 31 00 00

Address 0x10: 00 00 00 00 42 55 49 4c 54 49 4e 00 38 35 00 00

Address 0x20: 42 55 49 4c 54 49 4e 00 30 30 32 30 00 13 0c 07

Address 0x30: e3 ff ff ff ad ff 80 00 c0 bf a7 00 eb a0 ff ff

Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 5f 43 4c 45 49 45

Address 0x50: 58 34 34 30 30 2d 34 38 46 2d 53 00 00 00 00 00

Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff

Address 0x70: ff ff ff f4 59 4b 34 33 31 39 35 30 30 30 32 30

PIC 0 REV 01 BUILTIN BUILTIN 36x 1G SFP, 12x 1G/10G SFP/SFP+

Jedec Code: 0x7fb0 EEPROM Version: 0x02

P/N: BUILTIN S/N: BUILTIN

Assembly ID: 0xf050 Assembly Version: 01.01

Date: 12-19-2019 Assembly Flags: 0x00

Version: REV 01 CLEI Code: DUMMY\_CLEI

FRU Model Number: EX4400-48F-S

#### Board Information Record:

Address 0x00: ad ff 80 00 c0 bf a7 00 eb a0 ff ff ff ff ff ff

#### I2C Hex Data:

Address 0x00: 7f b0 02 fc f0 50 01 01 52 45 56 20 30 31 00 00

Address 0x10: 00 00 00 00 42 55 49 4c 54 49 4e 00 38 35 00 00

Address 0x20: 42 55 49 4c 54 49 4e 00 30 30 32 30 00 13 0c 07

Address 0x30: e3 ff ff ff ad ff 80 00 c0 bf a7 00 eb a0 ff ff

Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 5f 43 4c 45 49 45

Address 0x50: 58 34 34 30 30 2d 34 38 46 2d 53 00 00 00 00 00

Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff

Address 0x70: ff ff ff f4 55 55 55 55 55 55 55 55 55 55 55

Xcvr 0 REV 01 740-021487 JCG2007567 SFP-FX-PHY

Xcvr 1 REV 01 740-021487 JCG2007472 SFP-FX-PHY

Xcvr 2 REV 02 740-011613 N2PARS2 SFP-SX

Xcvr 3 NON-JNPR FCCODQT64000097 SFP-T

Xcvr 4		NON-JNPR	UVK0XK0	SFP28-25G-BASE-SR
Xcvr 5	REV 01	740-011614	AC1621SA1F7	SFP-LX10
Xcvr 6		NON-JNPR	FCCODQT64000098	SFP-T
Xcvr 7	REV 01	740-032293	P2PAXFD	SFP-LH
Xcvr 8	REV 02	740-014132	PPL6B1E	SFP-T
Xcvr 9		NON-JNPR	AD1601304UB	DUAL-SFP+-SR/SFP-SX
Xcvr 10	0	NON-JNPR	0501280230035763	SFP-SX
Xcvr 11	REV 01	740-032291	P2PAXEK	SFP-LH
Xcvr 12		NON-JNPR		UNSUPPORTED
Xcvr 13	REV 01	740-021308	CF34KM169	SFP+-10G-SR
Xcvr 15		NON-JNPR	A06C7WK	DUAL-SFP+-SR/SFP-SX
Xcvr 18	REV 01	740-032292	P2PAW6N	SFP-LH
Xcvr 19	REV 01	740-030658	ASL1HV6	SFP+-10G-USR
Xcvr 21	REV 01	740-030128	A1LAS9C	SFP+-10G-ER
Xcvr 22	REV 01	740-021308	ALD15Z3	SFP+-10G-SR
Xcvr 23	REV 01	740-021308	09T511103738	SFP+-10G-SR
Xcvr 25		NON-JNPR	A06BV81	DUAL-SFP+-SR/SFP-SX
Xcvr 26	REV 01	740-021309	AD0912LE01W	SFP+-10G-LR
Xcvr 27	REV 01	740-011614	C08A06993	SFP-LX10
Xcvr 28	REV 02	740-011613	PPM47Q1	SFP-SX
Xcvr 32	REV 01	740-031981	AD1709501W3	SFP+-10G-LR
Xcvr 33	REV 01	740-021309	UGM01T8	SFP+-10G-LR
Xcvr 34	REV 01	740-032295	P2PAK8C	SFP-LH
Xcvr 41	REV 01	740-021309	JCK2004644	SFP+-10G-LR
Xcvr 42	REV 01	740-021309	JCL2001937	SFP+-10G-LR
Xcvr 43	REV 01	740-021309	JCK2004690	SFP+-10G-LR
Xcvr 44	REV 01	740-021309	N2HBGBE	SFP+-10G-LR
Xcvr 46	REV 01	740-021309	N2GC5QB	SFP+-10G-LR
PIC 1	REV 01	650-114385	YK4319500020	2x100G QSFP28
Jedec Code:	0x7fb0	EEPROM Version:	0x02	
P/N:	650-114385	S/N:	YK4319500020	
Assembly ID:	0xf051	Assembly Version:	01.01	
Date:	12-19-2019	Assembly Flags:	0x00	
Version:	REV 01	CLEI Code:	DUMMY_CLEI	
		FRU Model Number:	EX4400-48F-S	

Board Information Record:

Address 0x00: ad ff 80 00 c0 bf a7 00 eb a0 ff ff ff ff ff ff

I2C Hex Data:

Address 0x00: 7f b0 02 fc f0 51 01 01 52 45 56 20 30 31 00 00

Address 0x10: 00 00 00 00 36 35 30 2d 31 31 34 33 38 35 00 00

Address 0x20: 59 4b 34 33 31 39 35 30 30 30 32 30 00 13 0c 07

Address 0x30: e3 ff ff ff ad ff 80 00 c0 bf a7 00 eb a0 ff ff

Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 5f 43 4c 45 49 45

Address 0x50: 58 34 34 30 30 2d 34 38 46 2d 53 00 00 00 00 00  
 Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff  
 Address 0x70: ff ff ff f4 55 55 55 55 55 55 55 55 55 55 55 55  
 Xcvr 0 REV 01 740-061000 1RC4044807P QSFP28-100G-CU1M  
 Xcvr 1 REV 01 740-061001 1RC424480CC QSFP28-100G-CU3M  
 PIC 2 REV 01 650-107358 YP4319450014 4x10G SFP+  
 Jedec Code: 0x7fb0 EEPROM Version: 0x02  
 P/N: 650-107358 S/N: YP4319450014  
 Assembly ID: 0xf052 Assembly Version: 01.01  
 Date: 11-07-2019 Assembly Flags: 0x00  
 Version: REV 01 CLEI Code: DUMMYCLEI  
 FRU Model Number: EX4350-48F

## Board Information Record:

Address 0x00: ad 01 80 00 0c 00 00 00 00 00 ff ff ff ff ff ff

## I2C Hex Data:

Address 0x00: 7f b0 02 fe f0 52 01 01 52 45 56 20 30 31 00 00  
 Address 0x10: 00 00 00 00 36 35 30 2d 31 30 37 33 35 38 00 00  
 Address 0x20: 59 50 34 33 31 39 34 35 30 30 31 34 00 07 0b 07  
 Address 0x30: e3 ff ff ff ad 01 80 00 0c 00 00 00 00 00 ff ff  
 Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 43 4c 45 49 00 45  
 Address 0x50: 58 34 33 35 30 2d 34 38 46 00 00 00 00 00 00 00  
 Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff  
 Address 0x70: ff ff ff 19 55 55 55 55 55 55 55 55 55 55 55 55  
 Xcvr 0 REV 01 740-084670 1A1C5GA45101A SFP28-25G-BASE-AOC-20M  
 Xcvr 1 REV 01 740-084670 1A1C5GA45101A SFP28-25G-BASE-AOC-20M  
 Xcvr 2 58C 19 NON-JNPR CN746EK142 SFP-SX  
 Xcvr 3 REV 02 740-011613 AM0943SEKDD SFP-SX  
 Power Supply 0 REV 00 640-107107 1EHB9410229 JPSU-550-C-AC-AFO

Jedec Code: 0x7fb0 EEPROM Version: 0x02  
 P/N: 640-107107 S/N: 1EHB9410229  
 Assembly ID: 0x04d2 Assembly Version: 00.00  
 Date: 10-25-2019 Assembly Flags: 0x00  
 Version: REV 00 CLEI Code: DUMMY CLEI  
 ID: JPSU-550-C-AC-AFO

## Board Information Record:

Address 0x00: b0 01 ff ff ff ff ff ff ff ff ff ff 00 04 00 ff

## I2C Hex Data:

Address 0x00: 7f b0 02 ff 04 d2 00 00 52 45 56 20 30 30 00 00  
 Address 0x10: 00 00 00 00 36 34 30 2d 31 30 37 31 30 37 00 00  
 Address 0x20: 31 45 48 42 39 34 31 30 32 32 39 00 00 19 0a 07  
 Address 0x30: e3 ff ff ff b0 01 ff ff ff ff ff ff ff ff ff  
 Address 0x40: 00 04 00 ff 01 44 55 4d 4d 59 20 43 4c 45 49 00  
 Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

```

Address 0x60: 00 00 00 00 00 00 41 30 30 ff ff ff ff ff ff ff
Address 0x70: ff ff ff 61 ff ff ff ff ff ff ff ff ff ff ff ff
Fan Tray 0                                     Fan Module, Airflow Out (AF0)
Jedec Code:   0x7fb0           EEPROM Version:   0x00
Assembly ID:  0xf040           Assembly Version: 00.00
Date:         00-00-0000       Assembly Flags:   0x00
Board Information Record:
Address 0x00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
I2C Hex Data:
Address 0x00: 7f b0 00 00 f0 40 00 00 00 00 00 00 00 00 00 00
Address 0x10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x20: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Fan Tray 1                                     Fan Module, Airflow Out (AF0)
Jedec Code:   0x7fb0           EEPROM Version:   0x00
Assembly ID:  0xf040           Assembly Version: 00.00
Date:         00-00-0000       Assembly Flags:   0x00
Board Information Record:
Address 0x00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
I2C Hex Data:
Address 0x00: 7f b0 00 00 f0 40 00 00 00 00 00 00 00 00 00 00
Address 0x10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x20: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Address 0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

```

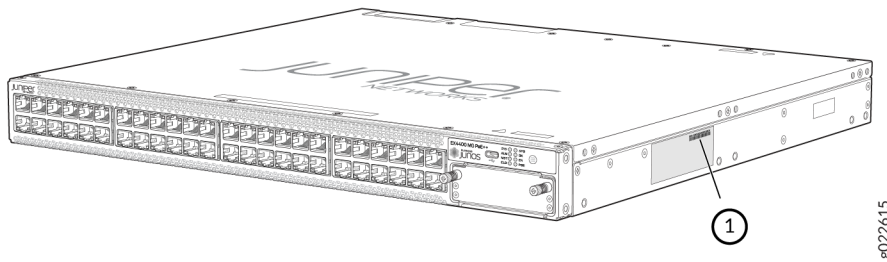
For information about the `show chassis hardware` command, see *show chassis hardware*.

## Locate the Chassis Serial Number ID Label on an EX4400 Switch

The serial number ID label is located on the right-hand side panel of the chassis on EX4400 switches (see [Figure 157 on page 300](#)).



**Figure 157: Location of the Serial Number ID Label on EX4400 Switches**



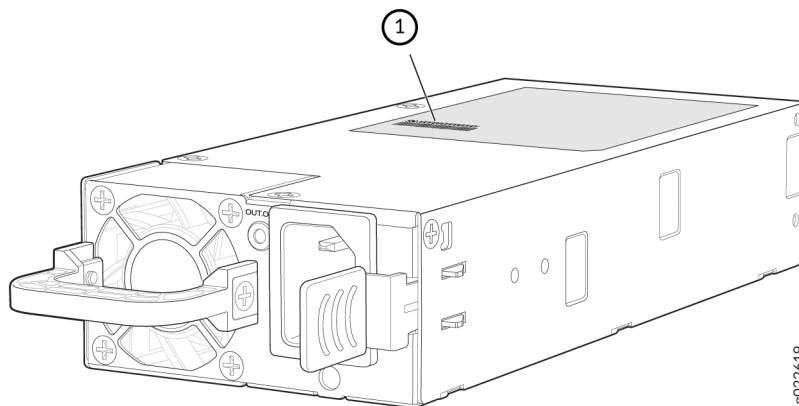
1– Serial Number ID Label

### Locate the Serial Number ID Labels on FRUs in an EX4400 Switch

The power supplies, fan modules, and extension modules installed in EX4400 switches are field-replaceable units (FRUs). You must remove the FRU from the switch chassis to see its serial number ID label.

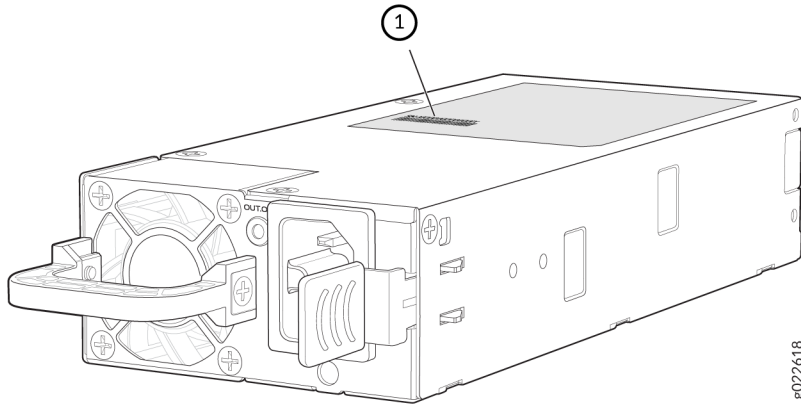
- *Power supply*—The serial number ID label is on the top of the power supply (see [Figure 158 on page 300](#), [Figure 159 on page 301](#), [Figure 160 on page 301](#), [Figure 161 on page 302](#) and [Figure 162 on page 302](#)).

**Figure 158: Location of the Serial Number ID Label on the 550-W AC Power Supply Used in EX4400 Switches**



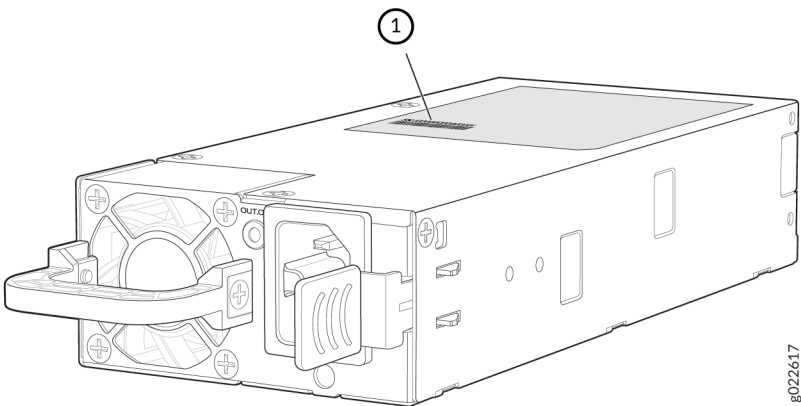
1– Serial Number ID Label

**Figure 159: Location of the Serial Number ID Label on the 1050-W AC Power Supply Used in EX4400 Switches**



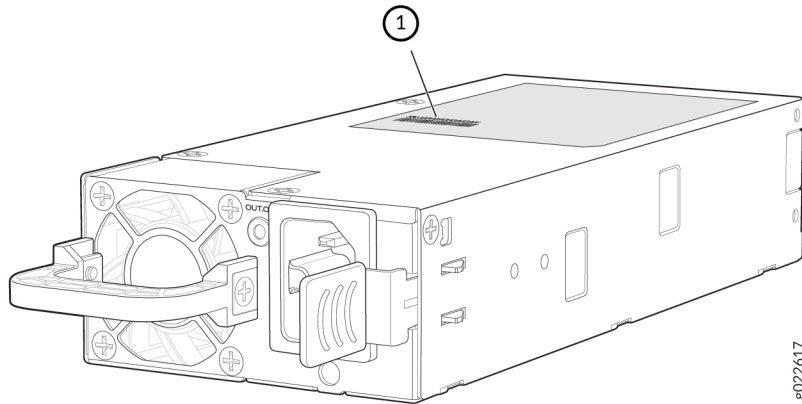
1– Serial Number ID Label

**Figure 160: Location of the Serial Number ID Label on the 1600-W AC Power Supply Used in EX4400 Switches**



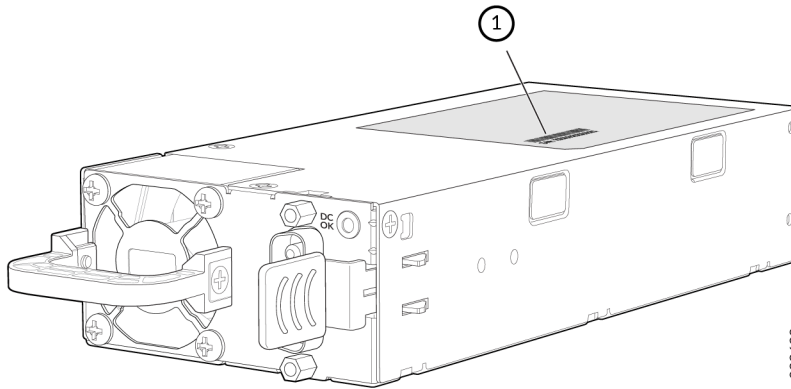
1– Serial Number ID Label

**Figure 161: Location of the Serial Number ID Label on the 2000-W AC Power Supply Used in EX4400 Switches**



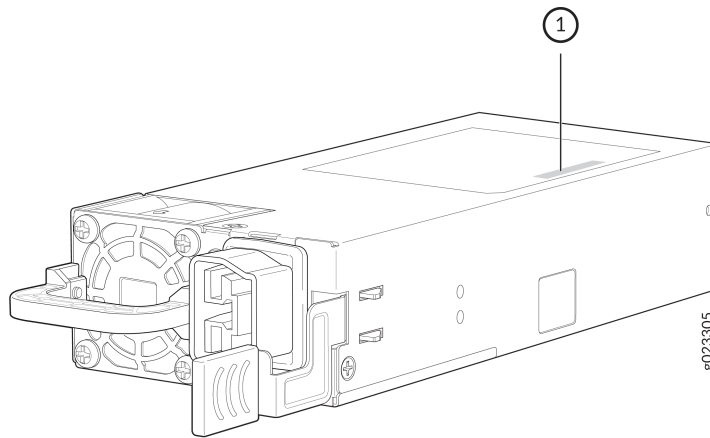
1– Serial Number ID Label

**Figure 162: Location of the Serial Number ID Label on a DC Power Supply Used in EX4400 Switches**



1– Serial Number ID Label

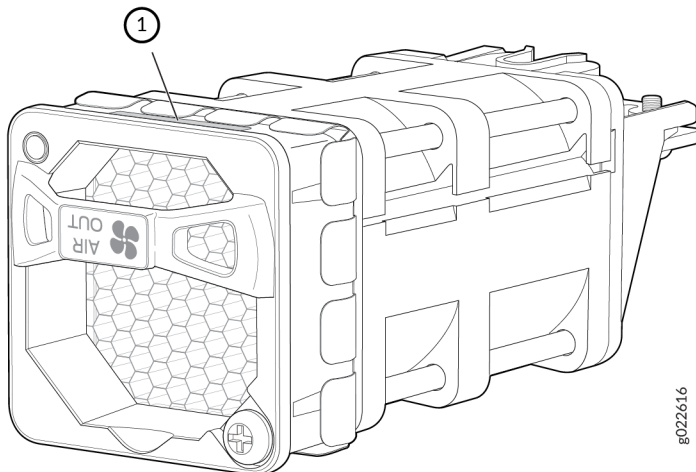
**Figure 163: Location of the Serial Number ID Label on the 550-W VDC Power Supply Used in EX4400 Switches**



1– Serial Number ID Label

- *Fan module*—The serial number ID label is on the top of the fan module (see [Figure 164 on page 303](#)).

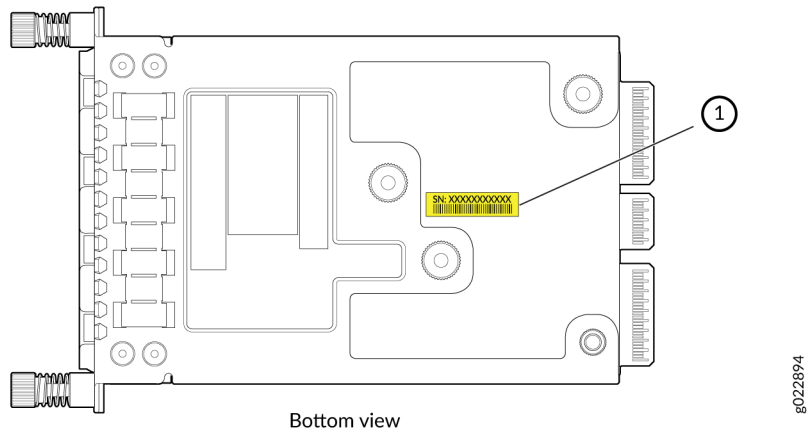
**Figure 164: Location of the Serial Number ID Label on the Fan Module Used in EX4400 Switches**



1– Serial Number ID Label

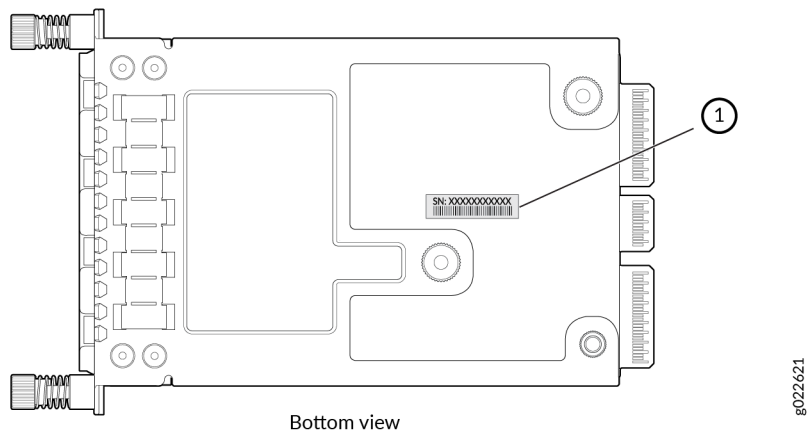
- *Extension module*—The serial number ID label is on the top of the extension module (see [Figure 165 on page 304](#), [Figure 166 on page 304](#), and [Figure 167 on page 305](#)).

**Figure 165: Location of the Serial Number ID Label on the 1x100GbE QSFP28 Extension Module Used in EX4400 Switches**



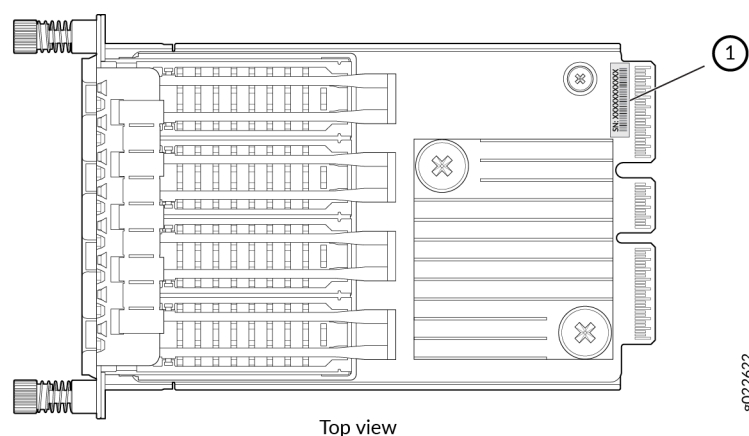
1– Serial Number ID Label

**Figure 166: Location of the Serial Number ID Label on a 4x10GbE SFP+ Extension Module Used in EX4400 Switches**



1– Serial Number ID Label

**Figure 167: Location of the Serial Number ID Label on a 4x25GbE SFP28 Extension Module Used in EX4400 Switches**



1– Serial Number ID Label

## Contact Customer Support to Obtain a Return Material Authorization

If you need to return a device or hardware component to Juniper Networks for repair or replacement, obtain an RMA number from JTAC. You must obtain an RMA number before you attempt to return the component.

After locating the serial number of the device or hardware component you want to return, open a service request with the JTAC on the Web or by telephone.

Before you request an RMA number from JTAC, be prepared to provide the following information:

- Your existing service request number, if you have one
- Serial number of the component
- Your name, organization name, telephone number, fax number, and shipping address
- Details of the failure or problem
- Type of activity being performed on the device when the problem occurred
- Configuration data displayed by one or more `show` commands

You can contact JTAC 24 hours a day, seven days a week, on the Web or by telephone:

- Service Request Manager: <https://support.juniper.net/support>

- Telephone: +1-888-314-JTAC (+1-888-314-5822), toll free in U.S., Canada, and Mexico



**NOTE:** For international or direct-dial options in countries without toll free numbers, see <https://support.juniper.net/support>.

If you are contacting JTAC by telephone, enter your 12-digit service request number followed by the pound (#) key for an existing case, or press the star (\*) key to be routed to the next available support engineer.

The support representative validates your request and issues an RMA number for return of the component.

## Pack an EX4400 Switch or Component for Shipping

### IN THIS SECTION

- [Pack an EX4400 Switch for Shipping | 306](#)
- [Pack EX4400 Switch Components for Shipping | 308](#)

If you are returning an EX4400 switch or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you pack the switch or component, ensure that you have:

- Followed all the steps listed in ["Contact Customer Support to Obtain a Return Material Authorization" on page 305](#).
- Retrieved the original shipping carton and packing materials. Contact your JTAC representative if you do not have these materials, to learn about approved packing materials (see ["Contact Customer Support to Obtain a Return Material Authorization" on page 305](#)).
- Ensure that you understand how to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- An ESD grounding strap—not provided

### Pack an EX4400 Switch for Shipping

Before you pack the switch:

1. On the console or other management device connected to the switch, enter the CLI operational mode and issue the following command to shut down the switch software:

```
user@switch> request system halt
```

Wait until a message appears on the console confirming that the operating system has halted.

2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Disconnect power from the switch.
4. Remove the cables that connect the switch to external devices.
5. Remove all optical transceivers installed in the switch.

Ensure that you have the following parts and tools:

- Number 2 Phillips (+) screwdriver—not provided
- The original switch packing material (cardboard box, accessory box and its contents, and foam padding)
- An ESD grounding strap—not provided
- Antistatic bag—not provided

If you need to transport the switch to another location or return the switch to Juniper Networks, you need to pack the switch securely in its original packaging to prevent damage during transportation.



**CAUTION:** Do not pack the switch in anything except its original container, or the switch might be damaged in transit.

To pack the switch:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. If the switch is installed in a rack or cabinet, have one person support the weight of the switch while another person unscrews and removes the mounting screws.
3. Remove the switch from the rack or cabinet and place the switch on a flat, stable surface.
4. Use the screwdriver to remove the rack mounting brackets from the switch chassis.
5. Place the switch in an antistatic bag.
6. Place the bottom portion of the packaging foam in the shipping carton.



7. Place the switch inside the cavity in the bottom packaging foam.
8. Place the top portion of the packaging foam on top of the switch.
9. If you are returning accessories or field-replaceable units (FRUs) with the switch, pack them as instructed in ["Pack EX4400 Switch Components for Shipping" on page 308](#)
10. Place the accessory box by the rear end of the chassis in the shipping carton.
11. Close the top of the cardboard shipping box and seal it with packing tape.
12. Write the RMA number on the exterior of the box to ensure proper tracking.

## Pack EX4400 Switch Components for Shipping

Ensure that you have the following parts and tools available:

- Antistatic bag, one for each component—not provided
- An ESD grounding strap—not provided

If you need to transport a switch component to another location or return a component to Juniper Networks, you need to pack the component securely in its original packaging to prevent damage during transportation.



**CAUTION:** Do not stack switch components. Return individual components in separate boxes if they do not fit together on one level in the shipping box.

To pack the switch components:

- Place individual components in antistatic bags.
- Use the original packing materials if they are available. If the original packing materials are not available, ensure the component is adequately packed to prevent damage during transit. The packing material you use must be able to support the weight of the component.
- Ensure that the components are adequately protected by wrapping them well with packing materials. Pack the component in an oversized box (if the original box is not available) with extra packing material around the unit so that the component is prevented from moving around inside the box.
- Securely tape the box closed.
- Write the RMA number on the exterior of the box to ensure proper tracking.

# 8

CHAPTER

## Safety and Compliance Information

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### IN THIS CHAPTER

- Safety Information for EX4400 | **310**
  - AC Power Electrical Safety Guidelines for EX4400 Switches | **310**
  - DC Power Electrical Safety Guidelines for EX4400 Switches | **311**
  - Agency Approvals for EX4400 Switches | **312**
  - Compliance Statements for EMC Requirements for EX4400 Switches | **314**
  - Acoustic Noise for EX4400 Switches | **317**
-

# Safety Information for EX4400

The [Juniper Networks Safety Guide](#) provides general safety information and guidelines for all Juniper Networks products. Follow the guidelines provided in the guide to reduce the likelihood of personal injury, equipment damage, and damage to surrounding areas.

Along with the information provided in the Juniper Networks Safety Guide, you must read and understand the *EX4400* specific safety information provided in this hardware guide.

## AC Power Electrical Safety Guidelines for EX4400 Switches

The following electrical safety guidelines apply to AC-powered devices:

- Note the following warnings printed on the device:

**“CAUTION: THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. DISCONNECT ALL POWER SUPPLY CORDS BEFORE SERVICING TO AVOID ELECTRIC SHOCK.”**

**“ATTENTION: CET APPAREIL COMPORTE PLUS D'UN CORDON D'ALIMENTATION. AFIN DE PRÉVENIR LES CHOCS ÉLECTRIQUES, DÉBRANCHER TOUT CORDON D'ALIMENTATION AVANT DE FAIRE LE DÉPANNAGE.”**

- AC-powered devices are shipped with a three-wire electrical cord with a grounding-type plug that fits only a grounding-type power outlet. Do not circumvent this safety feature. Equipment grounding must comply with local and national electrical codes.
- You must provide an external certified circuit breaker (2-pole circuit breaker on your device current rating) rated minimum 13 A, 16 A, or 20 A in the building installation or as per local electrical code.
- The power cord serves as the main disconnecting device for the AC-powered device. The socket outlet must be near the AC-powered device and be easily accessible.
- For devices that have more than one power supply connection, you must ensure that all power connections are fully disconnected so that power to the device is completely removed to prevent electric shock. To disconnect power, unplug all power cords (one for each power supply).

#### Power Cable Warning (Japanese)

**WARNING:** The attached power cable is only for this product. Do not use the cable for another product.

#### 注意

附属の電源コードセットはこの製品専用です。  
他の電気機器には使用しないでください。

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## DC Power Electrical Safety Guidelines for EX4400 Switches

- For permanently connected equipment, a readily accessible disconnect device shall be incorporated external to the equipment.
- For pluggable equipment, the socket-outlet shall be installed near the equipment and shall be easily accessible.
- Be sure to connect the ground wire or conduit to a solid central office earth ground.
- A closed loop ring is recommended for terminating the ground conductor at the ground stud.
- Run two wires from the circuit breaker box to a source of 48 VDC.
- Ensure that the polarity of the DC input wiring is correct. Under certain conditions, connections with reversed polarity might trip the primary circuit breaker or damage the equipment.
- Provide a 20 A 2-pole breaker or a circuit breaker as per local electrical code.



**NOTE:** Primary overcurrent protection is provided by the building circuit breaker. This breaker must protect against excess currents, short circuits, and earth grounding faults in accordance with NEC ANSI/NFPA 70.

# Agency Approvals for EX4400 Switches

## IN THIS SECTION

- [Compliance Statement for Argentina | 313](#)

EX4400 complies with the following standards:

- Safety
  - UL 60950-1:2007 R10.14 Information Technology Equipment
  - CAN/CSA-C22.2 No. 60950-1-07, Amd 1:2011, Amd 2:2014 Information Technology Equipment
  - IEC 62368-1:2014 Audio/Video, Information and Communication Technology Equipment
  - IEC 62368-1:2018 Audio/Video, Information and Communication Technology Equipment
  - EN 62368-1:2014+A11:2017 Audio/Video, Information and Communication Technology Equipment.
  - UL/CSA 62368-1:2019 Audio/Video, Information and Communication Technology Equipment
  - IEC/EN 60825-1 Safety of Laser Products – Part 1: Equipment classification and requirements.
- EMC
  - FCC 47 CFR Part 15
  - ICES-003 / ICES-GEN
  - BS EN 55032
  - BS EN 55035
  - EN 300 386 V1.6.1
  - EN 300 386 V2.2.1
  - BS EN 300 386
  - EN 55032
  - CISPR 32

- EN 55035
- CISPR 35
- IEC/EN 61000-3-2
- IEC/EN 61000-3-3
- AS/NZS CISPR 32
- VCCI-CISPR 32
- BSMI CNS 15936
- KS C 9835
- KS C 9832
- KS C 9610
- Energy Efficiency Requirements
  - AT&T TEER (ATIS-06000015.03.2016)
  - ECR 3.0.1
  - ETSI ES 203 136 V1.2.1
  - Verizon TEEER (VZ.TPR.9205 Issue 7)

## **Compliance Statement for Argentina**

EQUIPO DE USO IDÓNEO.

# Compliance Statements for EMC Requirements for EX4400 Switches

## IN THIS SECTION

- [Canada | 314](#)
- [Taiwan | 315](#)
- [European Community | 315](#)
- [Israel | 315](#)
- [Japan | 316](#)
- [Korea | 316](#)
- [United States | 316](#)
- [FCC Part 15 Statement | 317](#)

## Canada

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. Industry Canada does not guarantee the equipment will operate to the users' satisfaction.

Before installing this equipment, users should ensure that it is permissible to connect the equipment to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the inside wiring associated with a single line individual service can be extended by means of a certified connector assembly. The customer should be aware that compliance with the above conditions might not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, might give the telecommunications company cause to request the user to disconnect the equipment.



**CAUTION:** Users should not attempt to make electrical ground connections by themselves, but should contact the appropriate inspection authority or an electrician, as appropriate.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution might be particularly important in rural areas.

CAN ICES-003(A) / NMB-003(A)

## Taiwan

警告:為避免電磁干擾, 本產品不應安裝或使用於住宅環境。

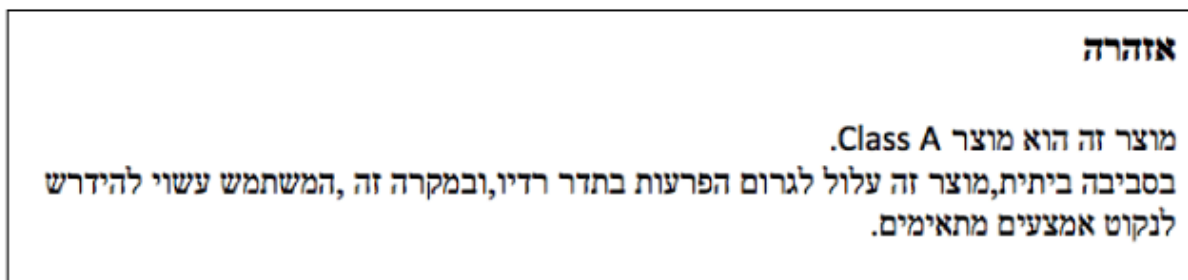
The preceding translates as follows:

**WARNING:** To avoid electromagnetic interference, this product should not be installed or used in a domestic environment.

## European Community

This is a Class A device. In a domestic environment this device might cause radio interference, in which case the user needs to take adequate measures.

## Israel



The preceding translates as follows:



Warning: This product is Class A. In residential environments, the product may cause radio interference, and in such a situation, the user may be required to take adequate measures.

## Japan

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用する  
と電波妨害を引き起こすことがあります。この場合には使用者が適切な対策  
を講ずるよう要求されることがあります。 VCCI-A

The preceding translates as follows:

This is a Class A device. In a domestic environment this device might cause radio interference, in which case the user needs to take adequate measures.

VCCI-A

## Korea

이 기기는 업무용(A급) 전자파적합기기로서 판  
매자 또는 사용자는 이 점을 주의하시기 바라  
며, 가정외의 지역에서 사용하는 것을 목적으로  
합니다.

Korean Class A Warning

g040913

The preceding translates as follows:

This equipment is Industrial (Class A) electromagnetic wave suitability equipment and seller or user should take notice of it, and this equipment is to be used in the places except for home.

## United States

The device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates,

uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users need to correct the interference at their own expense.

## FCC Part 15 Statement

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, might cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or TV technician for help.

## Acoustic Noise for EX4400 Switches

Table 115 on page 317 lists the typical acoustic noise measurements for EX4400 switch models taken from the front of the chassis at 23° C, in compliance with ISO 7779.

Table 115: Typical Acoustic Noise for EX4400 Switches

Switch Model	Power Supply or Power Supplies Installed	Typical Acoustic Noise in dB(A)
EX4400-48XP	One 2000-W AC power supply with front-to-back airflow	40.03

**Table 115: Typical Acoustic Noise for EX4400 Switches (Continued)**

Switch Model	Power Supply or Power Supplies Installed	Typical Acoustic Noise in dB(A)
	Two 2000-W AC power supply with front-to-back airflow	42.32
	One 2000-W DC power supply with front-to-back airflow	41.4
	Two 2000-W DC power supply with front-to-back airflow	42
EX4400-48MX P	One 2000-W AC power supply with front-to-back airflow	42.33
	Two 2000-W AC power supply with front-to-back airflow	47.35
	One 2000-W DC power supply with front-to-back airflow	44.5
	Two 2000-W DC power supply with front-to-back airflow	50.5
EX4400-24T	One 550-W AC power supply with front-to-back airflow	42.7
	One 550-W AC power supply with back-to-front airflow	46.08
	One 550-W DC power supply with front-to-back airflow	42.59
	One 550-W DC power supply with back-to-front airflow	46.19
	Two 550-W AC power supplies with front-to-back airflow	41.68
	Two 550-W AC power supplies with back-to-front airflow	46.03
	Two 550-W DC power supplies with front-to-back airflow	42.54
	Two 550-W DC power supplies with back-to-front airflow	46.54

**Table 115: Typical Acoustic Noise for EX4400 Switches (Continued)**

Switch Model	Power Supply or Power Supplies Installed	Typical Acoustic Noise in dB(A)
EX4400-24P	One 1050-W AC power supply with front-to-back airflow	44.45
	Two 1050-W AC power supplies with front-to-back airflow	44.23
	One 1600-W AC power supply with front-to-back airflow	48.8
	Two 1600-W AC power supplies with front-to-back airflow	48.1
	One 2000-W DC power supply with front-to-back airflow	40.3
	Two 2000-W DC power supply with front-to-back airflow	39.4
EX4400-24MP	One 1050-W AC power supply with front-to-back airflow	46.11
	Two 1050-W AC power supplies with front-to-back airflow	46.43
	One 1600-W AC power supply with front-to-back airflow	48.71
	Two 1600-W AC power supplies with front-to-back airflow	47.68
	One 2000-W DC power supply with front-to-back airflow	45.1
	Two 2000-W DC power supply with front-to-back airflow	42.8
EX4400-24X	One 550-W AC power supply with front-to-back airflow	42.71
	One 550-W AC power supply with back-to-front airflow	45.79
	One 550-W DC power supply with front-to-back airflow	43.32

**Table 115: Typical Acoustic Noise for EX4400 Switches (Continued)**

Switch Model	Power Supply or Power Supplies Installed	Typical Acoustic Noise in dB(A)
	One 550-W DC power supply with back-to-front airflow	46.62
	Two 550-W AC power supplies with front-to-back airflow	42.24
	Two 550-W AC power supplies with back-to-front airflow	46.18
	Two 550-W DC power supplies with front-to-back airflow	42.86
	Two 550-W DC power supplies with back-to-front airflow	47.39
EX4400-48T	One 550-W AC power supply with front-to-back airflow	42.32
	One 550-W AC power supply with back-to-front airflow	44.78
	One 550-W DC power supply with front-to-back airflow	42.72
	One 550-W DC power supply with back-to-front airflow	44.6
	Two 550-W AC power supplies with front-to-back airflow	42.87
	Two 550-W AC power supplies with back-to-front airflow	44.64
	Two 550-W DC power supplies with front-to-back airflow	42.73
	Two 550-W DC power supplies with back-to-front airflow	44.72
EX4400-48P	One 1600-W AC power supply with front-to-back airflow	44.78
	Two 1600-W AC power supplies with front-to-back airflow	44.68

**Table 115: Typical Acoustic Noise for EX4400 Switches (Continued)**

Switch Model	Power Supply or Power Supplies Installed	Typical Acoustic Noise in dB(A)
	One 2000-W DC power supply with front-to-back airflow	40.3
	Two 2000-W DC power supply with front-to-back airflow	39.2
EX4400-48MP	One 1600-W AC power supply with front-to-back airflow	44.16
	Two 1600-W AC power supplies with front-to-back airflow	44.5
	One 2000-W DC power supply with front-to-back airflow	39.39
	Two 2000-W DC power supply with front-to-back airflow	45.8
EX4400-48F	One 550-W AC power supply with front-to-back airflow	43.23
	One 550-W AC power supply with back-to-front airflow	44.91
	One 550-W DC power supply with front-to-back airflow	43.71
	One 550-W DC power supply with back-to-front airflow	44.93
	One 550-W VDC power supply with front-to-back airflow	41.86
	Two 550-W AC power supplies with front-to-back airflow	43.35
	Two 550-W AC power supplies with back-to-front airflow	44.79
	Two 550-W DC power supplies with front-to-back airflow	43.69
	Two 550-W DC power supplies with back-to-front airflow	44.61

**Table 115: Typical Acoustic Noise for EX4400 Switches *(Continued)***

Switch Model	Power Supply or Power Supplies Installed	Typical Acoustic Noise in dB(A)
	Two 550-W VDC power supplies with front-to-back airflow	42.22